PB-229 732

INVESTIGATION OF THE ODOR NUISANCE OCCURRING IN THE MADISON LAKES - PARTICULARLY LAKES MONOMA, WAUBESA, AND KEGONSA FROM JULY 1942 TO JULY 1943

Daniel W. Mead, et al

Wisconsin Governor's Committee to Study
Pollution of Lakes Waubesa and Kegonsa
Madison, Wisconsin

July 1943

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INVESTIGATION OF THE ODOR NUISANCE
OCCURRING IN THE MADISON LAKES

Particularly

LAKES MONONA, WAUBESA and KEGONSA

from

July 1942 to July 1943

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PART I

COMMITTEE'S SUMMARY AND DISCUSSION OF THE REPORT

Madison 3, Wisconsin, October 14, 1943

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Honorable Walter S. Goodland, Acting Governor
Executive Office - State Capitol
Madison, Wisconsin

Dear Sir:

This Committee, originally appointed by Governor Heil in December 1941 and reappointed by you in 1943, herewith transmits its report for the period ending July 1, 1943 and including one year's investigation of the chemical and biological conditions of the Madison lakes, - Monona, Waubesa and Kegonsa.

The figures, charts and maps of this report show the sources of pollution and nutritive material received by these lakes and the amount of such material contributed from each source. A careful study of the report will reveal the significance of these materials and their sources.

The ~~This~~ study shows that a large amount of nutritive and pollutional material is being added to the lakes from various sources. It further shows that the inorganic nitrogen contributed from these sources and from deposits on the lake bottom is a critical substance with relation to lake blooming. It appears that a significant reduction in the amount of this nutritive material reaching the lakes would reduce the frequency and density of lake blooms. This should not be interpreted to mean that algae growths in the lake will cease or that "blooms" will be completely eliminated. While the Madison sewage effluent contributes by far the largest amount of this substance to Lake Waubesa, 76.9%, it is not the sole -12 contributor. Lake Kegonsa receives 67.2% of its inorganic nitrogen and 88.6% of its organic nitrogen from Lake Waubesa. In the case of Lake Monona the storm and industrial sewers of Madison are large contributors.

As our studies have progressed it has been more and more apparent that the Madison sewage disposal plant is functioning efficiently. The popular impression that this plant is not purifying the sewage in a satisfactory manner is not correct. There is a question as to the capacity of this plant to handle the sewage and wastes from the metropolitan area if all of that waste which is now going into Lake Monona by various industrial and storm sewers was passed through the plant.

The contribution to the lakes by the Madison sewage disposal plant of nutritive material for the growth of algae is not the result of negligence or indifference but rather the results of constructive effort based on progress in science to purify a waste that is natural to the growth of the city and metropolitan area. This does not in any way change the problem of the nuisance created by excessive growth of algae in the lakes. The nuisance, as the results of this investigation show, is due to the excessive growth of algae and the odor created by it. Even though the Madison sewage plant effluent is not directly the cause of the odor that comes from the lake in the summer, the data clearly show that it is the largest contributor of nutritive material upon which algae feed.

Further investigation

This study has revealed definite evidence as to the causes of the algal growth in the Madison lakes. We think that the studies should continue another year. The coming year of study should be devoted to a re-assessment of the significance of the data in this report and to initiate new studies for a better understanding of the factors related to "Lake Blooming". The Madison Metropolitan Sewerage District has already made appropriations for the second year's work which is now under way.

Respectfully transmitted,

Daniel W Mead

Daniel W. Mead
Chairman of the Committee

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COMMITTEE'S DISCUSSION OF THE REPORT

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The committee's concept of the problem is set forth in this report. In the beginning the problem was divided into several parts - an immediate problem of controlling odors arising from heavy algal growth, and the more complex problem of lake pollution and fertilization in relation to the growth of algae in the lake water. Past experience had shown that the former could be accomplished temporarily by copper sulfate spraying. This was recommended. The latter problem, however, required patient and careful study of many factors associated with the natural phenomena of lake biology. To simplify this study we again divided the problem into two segments. One was a determination of the source and the amount and kind from each source of all pollutional and nutritive material going into lakes Monona, Waubesa and Kegonsa. This seemed like a relatively simple job and it seemed also most likely that such a study would contribute data of considerable significance relative to the intricate phenomena of lake blooming and nuisance odors. The other part of this larger problem was a study of all the factors which are reputed to be involved in the growth of algae in lakes. This was obviously much the most difficult phase of the whole problem, and would require a much longer study.

The committee was fortunate in the beginning to be able to secure Doctor C. N. Sawyer as its technical representative in the accumulation of the data here presented. Doctor Sawyer is a graduate of the University of Wisconsin with a doctorate in Sanitary Chemistry. Following his graduation he remained in the University here for two years doing special research on the biology of domestic sewage and industrial wastes. He has been energetic in his application, exact in his technical practice, and critical as to the significance of the results. The chemical and other data recorded in this report has been done by him and his two technical assistants. The tabulations and charts are his methods of portraying the relation of the results of thousands of determinations and observations. At the end of the report under "Discussion" he has brought into focus the significance of the data as it pertains to the problem of algal growth in the lake and the odor nuisance associated with it.

Dr. Sawyer's work has all been done in the State Laboratory of Hygiene where he has had the opportunity of consultation and helpful advice of the members of that staff.

In addition to the chemical studies done by Dr. Sawyer it was apparent to the committee that data on the amount and kind of growth supported by the nutritive material in the lake water was necessary. In order to obtain this information the committee felt the need of obtaining the service and advice of a biologist experienced in this field of work and also one whose interest could not in any way be concerned with special interest in the community or around the lake shores. To secure such a person we appealed through the State Board of Health to the Surgeon General of the United States Public Health Service. The Surgeon General of this Service, recognizing the importance of the study, kindly detailed Dr. J. B. Lackey to make the studies and to act as consultant to the committee in organizing and carrying out the survey. Dr. Lackey is the Senior Biologist to the U. S. Public Health Service sanitary laboratory located in Cincinnati. He has made frequent visits to Madison during our study, and it has been with his advice and criticism that this report has been prepared. He has added to the report his own dealing with the special studies which he has made and his comments concerning the whole report. The committee takes this opportunity to express its great appreciation to Dr. Lackey and to the U. S. Public Health Service for his helpful assistance and constructive criticism as the work has progressed.

This report deals with the sources and kinds of pollutional and nutritive material going into the above mentioned lakes and the influence of some of these materials on algal growths. The determinations made in this study, and recorded in this report in a quantitative as well as a qualitative manner, have revealed a concatenation of biological phenomena which is highly significant to the problem of algal growth and lake odors.

While the significance of the findings in the report will be revealed to those who have the time to spend in its study, we have thought it important after careful study to dwell briefly on some of the most important points.

Inorganic nitrogen and phosphorus have long been recognized as nutritive materials necessary to algal growth. These together with sunlight, available carbon dioxide and proper temperature have been considered to be some of the most important factors governing the growth of algae in surface waters. The quantitative relation between the nutritive substances and the frequency of lake blooming is here reported in detail. The question was, is there a critical relation between these substances and the frequency of lake blooming and the density of the bloom? This question bore directly upon the quantitative relation between these substances, inorganic nitrogen and phosphorus, and the sources from which they are contributed to the lake. In other words if these nutritive materials or any one of them could be shown to be critical, that is, necessary in certain amounts to support algal growth, then the amounts contributed from various sources would be helpful in determining the significance of the various sources to the blooming of the lakes. This report records the data obtained in this study and that together with the graphs show the quantitative relation of the various sources for nutritive and pollutional material which empty into the lakes and the relation of these materials to the rise and fall of algal density, lake blooming, in the lakes.

Inorganic nitrogen

Fig. 14 illustrates the relation of lake blooming and the inorganic nitrogen in the lake water.

This graph shows that in June, before a heavy bloom, that the inorganic nitrogen in solution in the surface water of Lake Waubesa amounted to almost 1.0 part per million. After the algal growth had become so dense that it was recognized as a heavy scum on the lake surface the inorganic nitrogen in solution in the surface water was found to have been reduced to .3 parts per million. In other words the algae in order to grow to the density attained between these dates in

June used up more than half of the inorganic nitrogen in solution in the surface water. It is important to note that this reduction of inorganic nitrogen took place in water where the algal growth was most dense. Fig. 14 shows this in the results of the examination of samples taken farther and farther below the surface. It will be seen that at 9 meters the water contained slightly more than 1 p.p.m. of inorganic nitrogen while close to the surface, 1 meter, the inorganic nitrogen content was less than .3 p.p.m. It seems clear from these results that inorganic nitrogen is a critical substance for the growth of algae in these lakes.

This graph also gives a clue to what controls the frequency of lake blooming. As the deeper water in the lake retains a high amount of inorganic nitrogen, it appears that it is from that source that the surface water regains some of its inorganic nitrogen and is again prepared to support another bloom.

The frequency with which this occurs depends upon the quantity of inorganic nitrogen and to some extent the organic nitrogen contributed to the lake by the various effluents and other natural drainage waters.

Organic nitrogen

The organic nitrogen is the nitrogen bound up in chemical compounds of various sorts, which have not been broken down to their elemental constituents. Some of this occur as finely divided suspended matter and which in the course of time settles to the bottom of the lake or passes out into the river leaving the lake. On the lake bottom it undergoes a process of disintegration which finally results in the production of inorganic nitrogen. It is from this source that the surface water of the lake is partly replenished with inorganic nitrogen after its depletion by the growth of algae. In other words the bottom of the lake is a storehouse from which some of the food material needed by algae is contributed to the water in the lake.

The organic nitrogen represents decomposable matter whereas inorganic nitrogen does not. The organic nitrogen is considered pollutional because it undergoes decomposition in the lake. The inorganic nitrogen is the result of completed decomposition. It is stabilized nitrogen and is therefore considered to be non-pollutional nutritive material.

Figure 9 shows the amount of inorganic nitrogen which is contributed from various sources to lakes Waubesa and Kegonsa and Figure 12 shows the same data for organic nitrogen. The study of these two figures contributes to an understanding of the biological activity of these lakes and to the significance of these two substances. It will be seen in Figure 9 that 859,113 pounds of inorganic nitrogen is poured into lake Waubesa during the course of a year and of this 76.9% comes from the Madison sewage plant effluent. However, not all of this inorganic nitrogen reaches lake Kegonsa. This figure shows that lake Kegonsa received from lake Waubesa 353,992 pounds of inorganic nitrogen. This is a loss of 505,121 pounds of inorganic nitrogen in lake Waubesa and the Yahara river before it empties into lake Kegonsa. The question then is, what became of that much inorganic nitrogen? Since inorganic nitrogen is in solution it could not have settled out. It must then have been removed by the biological activity in the lake and river water. This biological activity is the life that thrives in the lake; that is, algae and things which subsist on them. If enough growth of algae and things which live on algae has taken place to remove over 500,000 pounds of inorganic nitrogen from the water in Lake Waubesa then the amount of organic nitrogen in the water leaving Lake Waubesa must be greatly increased over that put into this lake (Waubesa) from all of its sources. Figure 12 shows this relation. It will be seen that Lake Waubesa received only 241,901 pounds of organic nitrogen from all of its sources and that the sewage effluent contributed only about one third of the total amount. When the data for Lake Kegonsa are examined it is seen that 370,475 pounds of organic nitrogen poured into it during the year and that 88.6% was contributed by the Yahara River. This is 128,574 pounds more than all of the organic nitrogen entering Waubesa from all of its sources. It is apparent that the only source for this increase in organic nitrogen in the Yahara River water leaving Waubesa and before it enters Kegonsa is that which is created by the increase in organic life in the water.

The decrease in inorganic nitrogen from Lake Waubesa to Lake Kegonsa and the increase in organic nitrogen is evidence that the inorganic nitrogen has been converted into organic matter in the form of algae and other forms of life which exist on them. Confirmation of this data is seen in Fig. 13 and 14 in which it is shown that with the increase in biological activity in the lakes there is a fall in the concentration of inorganic nitrogen in the surface water of the lake.

A study of Figure 4 reveals the sources of nutritive materials contributed to the Yahara river as it passes through the City of Madison from Lake Mendota to Lake Monona. It is significant that from July through December the largest amount of the inorganic nitrogen came from the storm sewers and industrial wastes, ranging during this period from 58.8% to as high as 89.5%. The actual total contribution of inorganic nitrogen from the storm and industrial sewers during the six months from July 1942 to January 1943 was 20,148 pounds. Although the Figure shows a percentage decrease, 75.8 to 36.6%, in the inorganic nitrogen contributed from this source for the six months period, January 1, 1943 to July 1, 1943, there was an actual increase. The total amount of the inorganic nitrogen put into the Yahara during the latter period was 34,980 pounds. This is an actual increase of 14,832 pounds. The decrease in the percentage of nutritive material from the sewers is due to the increased amount of flow that was permitted to come out of lake Mendota. This was accomplished by lowering the dam which controls the amount of water which leaves Mendota. The result was a greater dilution of the sewer effluents and a corresponding percentage decrease in the nutritive material. This condition is also revealed in Figures 2, 10, 11 and 12. The data show that evidence of sewer pollution was obtained not only by increased inorganic nitrogen but also by increased organic nitrogen and suspended solids in the water of the Yahara river.

Figure 4a shows the location of the important storm and industrial sewers that empty into lake Monona. The data show that it is often difficult to tell whether a sewer is a storm or an industrial sewer. The amount of pollutional and nutritive material entering lake Monona from the sewers of Madison is large. Monona also receives as much nutritive material in the effluent from the Truax Field sewage treatment plant as it would receive from a city of equal population, using comparable treatment methods.

Biological Report

The biological report is in accord with the chemical data insofar as it is comparable. For the most part they can not be compared. The biological study is concerned with not only quantitative but qualitative determinations of certain forms of microscopic life feeding upon the nutritive materials in the lake. This was accomplished by determining the total number of cells found per cubic centimeter and the identification of each type of cell. The quantitative determination shows what would be expected from the chemical examination. For instance, on page 41 it is stated: "These three lakes were richer by far than Mendota and twelve other lakes in southern Wisconsin in regard to the amount of plankton." The variety of forms included in this plankton and the frequency with which the density of the various types changed (bloomed) is not discussed since the number of samples examined were too few and the data too fragmentary.

Dr. Lackey's report (Biological Report) points out clearly the large number of factors concerning the growth of algae in lakes and other surface waters that are not understood. Therefore he points out the necessity for much farther study. The discussion of the lack of knowledge of the growth of specific algae and a lack of understanding of the sequence of events which cause the sudden death of certain forms and the development of others is suggestive of the type of work which needs yet to be done. The nutritive value of the phosphorus and nitrogen he discusses briefly and points out that any appreciable reduction in the nutritive material which is drained into these lakes, Monona, Waubesa and Kegonsa, would undoubtedly decrease the amount of growth of the various forms of algae.

This is in accord with the observations recorded in this report under the chemical section and also observations reported by Dr. Domogalla in Engineering News Record for December 9, 1926. He said: "The total amount of organic nitrogen increased in all the lakes since the plankton increased. Lake Waubesa, which has the largest amount of algae growing in its water, showed a higher organic nitrogen content than the other lakes. On the other hand, the ammonia and nitrates as well as the soluble phosphorus made a marked drop during the growing season on the lakes. The fluctuation in these forms in lake Monona needs further explanation. As the algae increased, the ammonia, nitrates and phosphorus content dropped, yet not so markedly as in the other lakes. The copper treatment reduced the algae growth and at times the forms of nitrogen and phosphorus increased during the summer months."

PART II

REPORT OF INVESTIGATIONS

PREFACE

CHRONOLOGICAL ORDER OF SIGNIFICANT EVENTS PRECEDING INITIATION OF THE SURVEY

Legislation (1941)

Wisconsin Legislature - Bill No. 213, S. - Passed by both houses would prohibit any city or metropolitan sewage district of over 45,000 population from dumping effluent from its sewage system into lakes more than two and less than six square miles in area if these lakes are within ten miles of the system.

Bill No. 213, S. vetoed by Governor and Funds for Financing an Investigation Secured from the Madison Metropolitan Sewerage District.

Governor Appoints Committee to Study Pollution of Lakes Waubesa and Kegonsa.

Recommendations of Governor's Committee (January 1942)

"First, that facilities be provided for the adequate treatment of the lakes with copper sulfate to effect abatement of the nuisance odor due to the growth of algae until a more satisfactory solution can be arrived at.

Second, that immediate steps be taken to provide the personnel necessary to begin an investigation of the sources from which nitrogenous material, phosphates and other material which will act as food substance for algae are contributed and the amount contributed from each source. This investigation could be completed within a twelve months period. It must be made clear that from this study alone it does not seem that it will be possible to say whether the removal of the sewage plant effluent from the lake would reduce the food substance to such level that algae would not grow. It would be a step toward the solution of the larger problem, that is, an understanding of all the factors that contribute to the growth of algae in the lakes.

Third, that the state provide sufficient funds for the investigation of all the factors which are responsible for the growth of algae in the lakes in the state, and that these funds be made available to the State Board of Health. The amount of money needed should be specified by the State Board of Health after a careful consideration of the course the investigation will follow."

INTRODUCTION

Since it is considered highly probable that many readers of this report will not be familiar with the Madison Lakes Area and the problems involved, this introduction will be detailed in account.

The Problem

The Madison Lakes, especially the more shallow downstream lakes which occur below the City of Madison, have been troubled for some time during the warm seasons of the year with the development of conditions eventually resulting in offensive odors or stenches and unsightly shorelines.

The cause of these offensive conditions has been the basis for much conjecture, contention, and debate. Two schools of opinion have evolved: One holds that the difficulty is due to sewage disposal practices of the City of Madison and the other holds that natural drainage is the important consideration. The Madison Lakes are in the heart of a rich agricultural and dairy area.

Due to the fact that only limited information existed on the relative contributions of fertilizing minerals from agricultural versus other sources in the Madison Lakes Area, the Committee chose to determine this information as a basis of understanding of the general problem.

Preliminary Conclusions of the Governor's Committee Concerned with the Pollution Problem in the Madison Lakes

After considerable study and observation of the local lake problem, the conclusion was reached that the major part of the *offensive conditions and stenches produced are a direct result of accumulations of algal growths in advanced stages of decomposition*. It was further concluded that the stimulation of such algal growths was not a direct result of pollution of the lakes in the ordinary sense, but, rather, was related to the fertilization of the water by enrichment with minerals such as nitrogen, phosphorus, potassium, and possibly other fertilizing elements and compounds. These conclusions were based on many considerations of which the following are a few:

1. Algal problems are most prevalent in shallow lakes receiving drainage from rich agricultural areas and/or urban communities.

2. Chemical analyses of algae show nitrogen to be one of the major component elements, with phosphorus a minor element.

3. Stream pollution surveys where domestic sewage is involved have shown zones of intense biological productivity to occur in reaches of the streams below the sewer outfall.

4. The science of Hydroponics is based on the principles of ordinary agricultural fertilization applied to water.

5. Fertilization of lakes is being practiced in some areas, with ordinary commercial fertilizers, to stimulate greater plankton growths, which in turn support greater fish populations.

6. Some authorities place considerable importance on agricultural land drainage and, thereby, infer that there is a correlation between fertilization and algal "blooms".

7. The growths causing nuisances in inland lakes are largely members of the plant kingdom. All ordinary plant growth is dependent upon a substrate containing nitrogen, phosphorus, potassium, and other elements.

8. Sewage of domestic origin although highly purified by modern methods of treatment remains after treatment abundantly rich in phosphorus, nitrogen, potassium, and possibly other elements of significance.

9. High concentrations of certain fertilizing elements which accumulate in lake waters during the winter months are rapidly depleted in the surface waters during the growing period of warm weather.

Scope of Survey

Although the Committee was charged with studying the pollution of Lakes Waubesa and Kegonsa, it was deemed advisable to include Lake Monona in the survey as it, also, is one of the lakes causing considerable trouble. It was anticipated that sewage effluent from Truax Field would be added to Lake Monona during the course of the survey and this was further reason for studying the lake as diligently as the others mentioned above. Lakes Wingra and Mendota were relegated to minor investigations because of their normally good behavior as far as stench producing ability is concerned.

Methods of Survey

I. Measurement of Fertilizing Elements

The determination of the quantity of fertilizing minerals entering a lake resolves itself into two problems which are:

1. Measurement of all tributary stream flows.
2. Chemical determination of fertilizing minerals in the tributary waters.

A map showing the Madison Lakes Area and the location of all stream gaging stations and sampling stations is given in Fig. 1.

II. Biological Studies

These studies were initiated in an attempt to correlate the changes occurring in chemical composition of the lake waters with biological changes, such as "blooming".

III. Observations on Other Southeastern Wisconsin Lakes

Chemical and biological data were obtained on 12 other lakes as an aid in interpreting the data obtained on the Madison Lakes.

IV. Research

Growth studies were conducted in a greenhouse on specimens of the various samples collected to determine their ability to produce algal "blooms". These data were mainly for interpretive purposes.

Nature and Frequency of Observations

Stream Flow Measurements - A total of 385 actual measurements were made. Data on the flow out of Lake Waubesa were obtained from the U. S. Geological Survey. The flow measurements were supplemented with gage readings and with alkalinity measurements. The flow of effluent from the Madison Sewage Plant was obtained from daily pumping records measuring the flow to the plant as recorded by the Madison Metropolitan Sewerage District. The percentage of the total flow to each of the lakes that was actually gaged is as follows:

	Range	Average
Lake Monona	81-98%	89%
Lake Waubesa	84-98%	91%
Lake Kegonsa	90-96%	93%

Chemical Data - Routine samples were collected weekly at all of the regular stations except during the winter months when samples were collected thrice each month. Daily sampling of Starkweather, Nine Springs, and Door Creeks, the three largest creeks tributary to the lakes, was practiced during the last six months of the survey.

During the 12 months of the survey 2,391 samples were collected and analyzed for a total of 15,345 determinations, most of which were for nitrogen in its various forms and for soluble phosphorus. Other routine determinations on the weekly samples were for total phosphorus, suspended solids, volatile suspended matter, and alkalinity. Potassium, biochemical oxygen demand, and sulfate analyses were made on certain samples.

Significance of Chemical Observations

The soluble phosphorus, potassium, and inorganic nitrogen* content of a tributary water are considered most indicative of its fertilizing potency, since these represent readily available forms of the elements. The organic nitrogen content is considered of secondary importance because the nitrogen is in a form which is made available incompletely and slowly.

The suspended organic matter contained in the tributary waters is given consideration mainly for the reason that certain groups have placed considerable emphasis on the solids in the Madison sewage plant effluent as being the cause of the stenches and unsightly conditions along the shores of Lake Waubesa.

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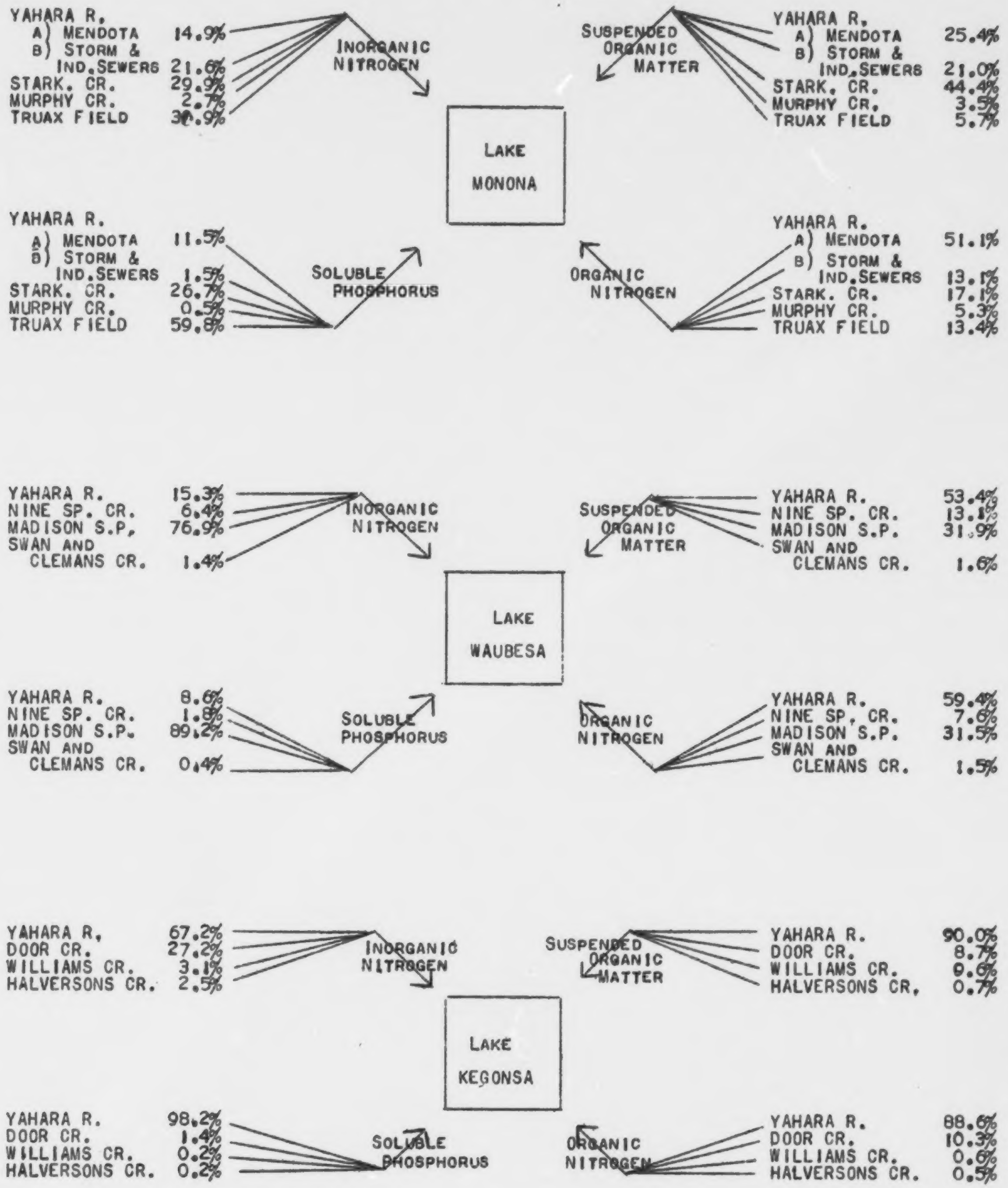
*Inorganic nitrogen - the sum of ammonia, nitrite, and nitrate nitrogen.

SUMMARY

POLLUTION AND FERTILIZATION OF MADISON LAKES



LAKE MONONA

	INORGANIC NITROGEN
YAHARA R., A) MENDOTA	14.9%
B) STORM & IND.SEWERS	21.6%
STARK. CR.	29.9%
MURPHY CR.	2.7%
TRUAX FIELD	30.9%

	SUSPENDED ORGANIC MATTER
YAHARA R., A) MENDOTA	25.4%
B) STORM & IND.SEWERS	21.0%
STARK. CR.	44.4%
MURPHY CR.	3.5%
TRUAX FIELD	5.7%

	SOLUBLE PHOSPHORUS
YAHARA R. A) MENDOTA	11.5%
B) STORM & IND.SEWERS	1.5%
STARK. CR.	26.7%
MURPHY CR.	0.5%
TRUAX FIELD	59.8%

	ORGANIC NITROGEN
YAHARA R. A) MENDOTA	51.1%
B) STORM & IND.SEWERS	13.1%
STARK. CR.	17.1%
MURPHY CR.	5.3%
TRUAX FIELD	13.4%

LAKE WAUBESA

	INORGANIC NITROGEN
YAHARA R.	15.3%
NINE SP. CR.	6.4%
MADISON S.P.	76.9%
SWAN AND CLEMANS CR.	1.4%

	SUSPENDED ORGANIC MATTER
YAHARA R.	53.4%
NINE SP. CR.	13.1%
MADISON S.P.	31.9%
SWAN AND CLEMANS CR.	1.6%

	SOLUBLE PHOSPHORUS
YAHARA R.	8.6%
NINE SP. CR.	1.8%
MADISON S.P.	89.2%
SWAN AND CLEMANS CR.	0.4%

	ORGANIC NITROGEN
YAHARA R.	59.4%
NINE SP. CR.	7.6%
MADISON S.P.	31.5%
SWAN AND CLEMANS CR.	1.5%

LAKE KEGONSA

	INORGANIC NITROGEN
YAHARA R.	67.2%
DOOR CR.	27.2%
WILLIAMS CR.	3.1%
HALVERSONS CR.	2.5%

	SUSPENDED ORGANIC MATTER
YAHARA R.	90.0%
DOOR CR.	8.7%
WILLIAMS CR.	0.6%
HALVERSONS CR.	0.7%

	SOLUBLE PHOSPHORUS
YAHARA R.	98.2%
DOOR CR.	1.4%
WILLIAMS CR.	0.2%
HALVERSONS CR.	0.2%

	ORGANIC NITROGEN
YAHARA R.	88.6%
DOOR CR.	10.3%
WILLIAMS CR.	0.6%
HALVERSONS CR.	0.5%

FINDINGS OF FACT

A. LAKE MONONA

Sources of Pollution and Fertilization

The main sources of fertilizing minerals and pollutional matter entering Lake Monona are as follows:

1. Effluent from Lake Mendota
2. Truax Field sewage plant effluent
3. Starkweather Creek
4. Murphys Creek
5. Industrial wastes
6. Storm water
7. Domestic sewage
8. Garbage and refuse
9. Oil wastes

Contributions from the Various Sources

The sampling stations in this area were selected to obtain a complete measure of the contributions from the first four sources mentioned above and to include a representative portion of the contributions from the fifth and sixth sources. To accomplish the latter, two sampling stations were established on the Yahara River within the city. One was located at the outlet of Lake Mendota and the other at Rutledge St., across town. It is estimated that approximately 75% of the total pollutional load was under measure during the year, the unmeasured portion being mainly from industrial wastes, domestic sewage, and storm water.

The relative and actual quantities of the measured contributions of fertilizing minerals reaching Lake Monona during the 12 month survey are given in Figs. 2 and 3. From these charts it can be seen that the major contributor of inorganic

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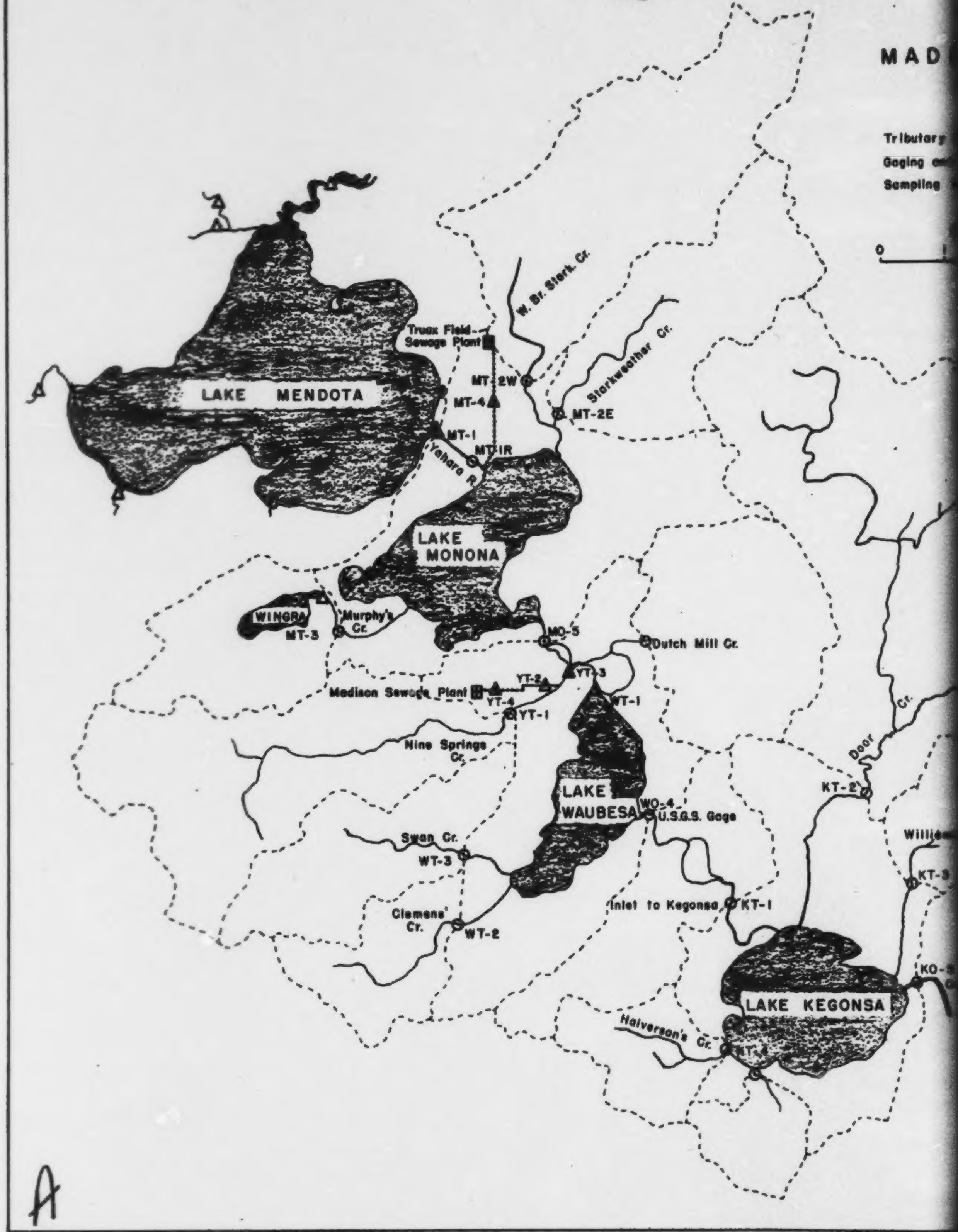
MADI
Tributary
Gaging an
Sampling
0
LAKE MENDOTA
Truax Field-Sewage Plant
W. Br. Stark. Cr.
Starkweather Cr.
MT-2W
MT-4
MT-2E
MT-1
MT-1R
Yahara R.
LAKE MONONA
WINGRA
Murphy's Cr.
MT-3
MO-5
Dutch Mill Cr.
YT-3
YT-2
Madison Sewage Plant
YT-4
YT-1
WT-1
Nine Springs Cr.
LAKE WAUBESA
WO-4
U.S.G.S. Gage
Swan Cr.
WT-3
Clemens' Cr.
WT-2
Inlet to Kegonsa
KT-1
Door Cr.
KT-2
Willi
KT-3
KO-
LAKE KEGONSA
Halverson's Cr.
KT-4

A

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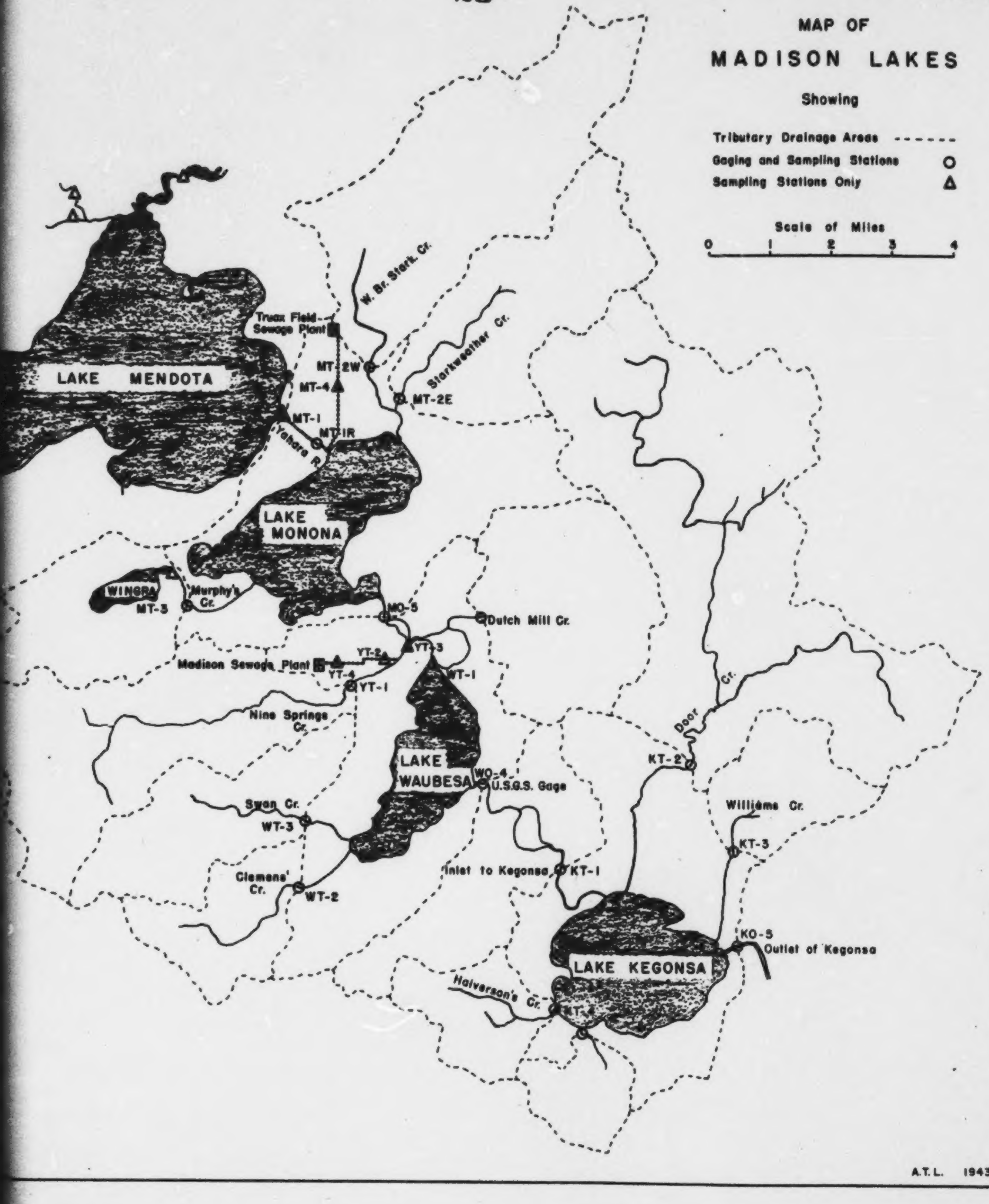
FIG. 1


Tributary Drainage Areas
Gaging and Sampling Stations ○
Sampling Stations Only △
Scale of Miles
0
1
2
3
4
LAKE MENDOTA
Truax Field Sewage Plant
W. Br. Stark. Cr.
Starkweather Cr.
MT-2W
MT-2E
MT-4
MT-1
MT-1R
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Clemens' Cr.
WT-2
Inlet to Kegonsa
KT-1
Door Cr.
KT-2
Williams Cr.
KT-3
KO-5
Outlet of Kegonsa
LAKE KEGONSA
Halverson's Cr.
KT-4

MAP OF

MADISON LAKES

Showing

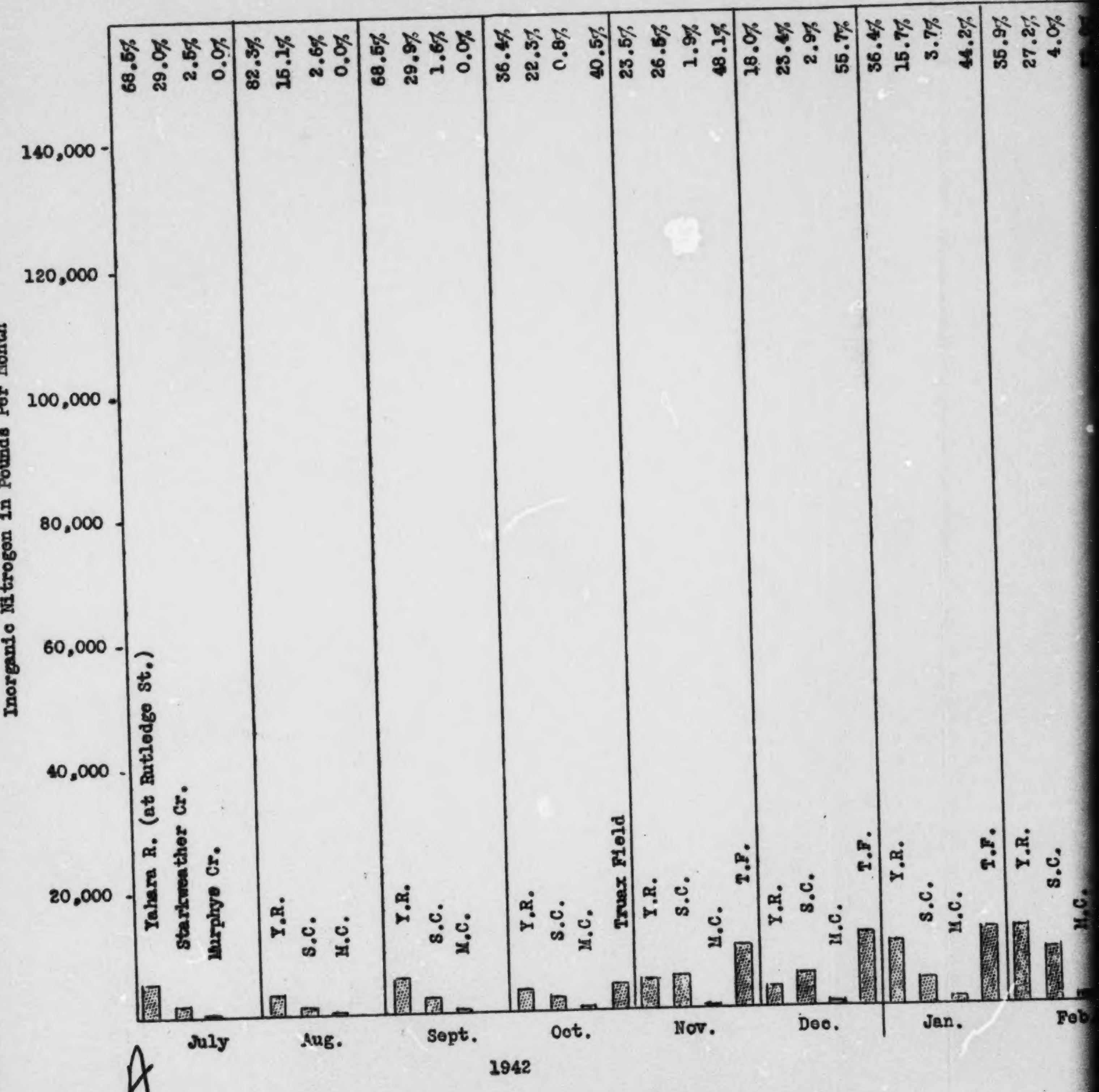
A.T.L. 1943

B

FIG. 2

LAKE MONONA

MEASURED CONTRIBUTIONS OF INORGANI



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LAKE MONONA

CONTRIBUTIONS OF INORGANIC NITROGEN

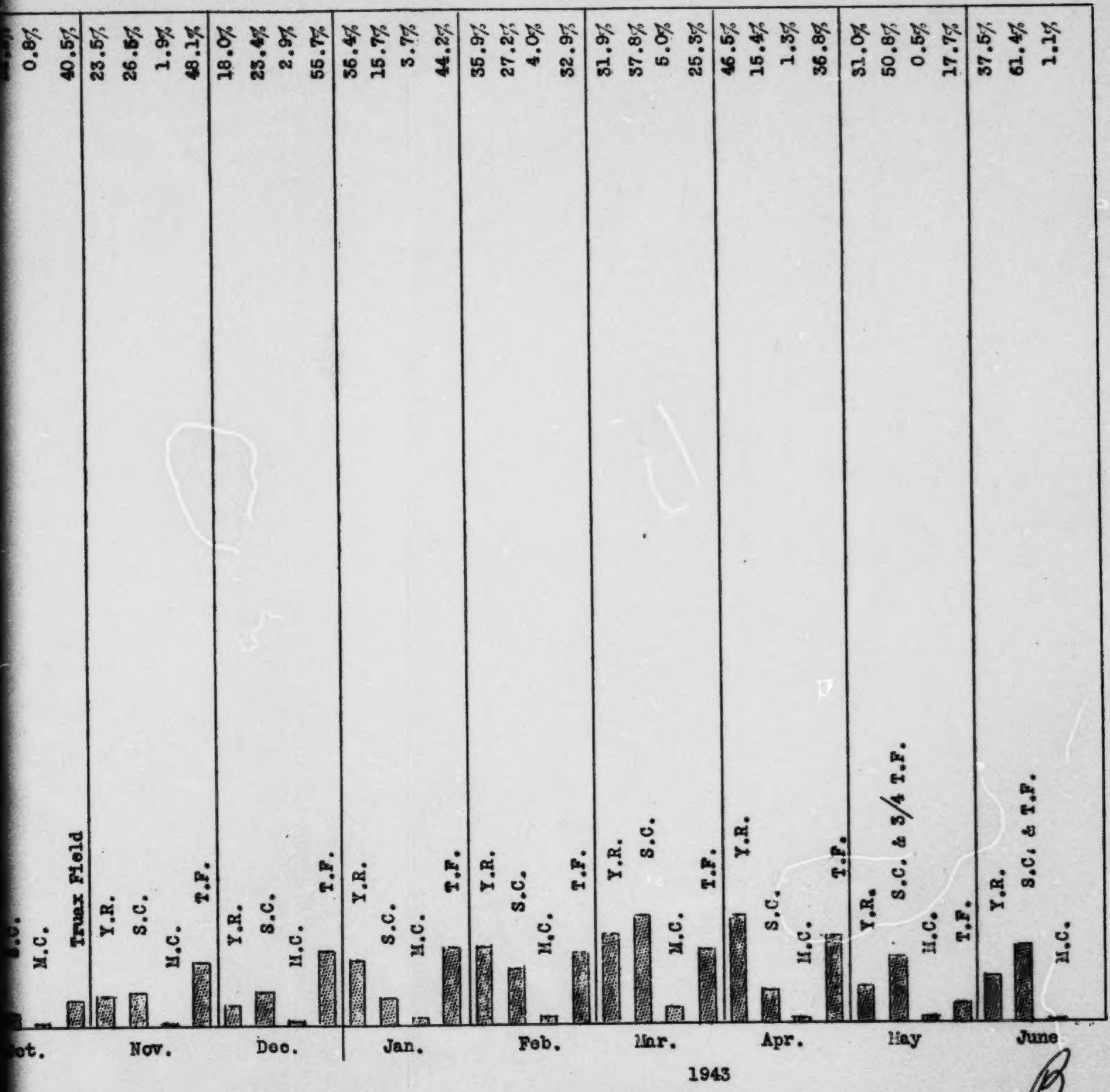

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FIG. 3

LAKE MONON

MEASURED CONTRIBUTIONS OF SO

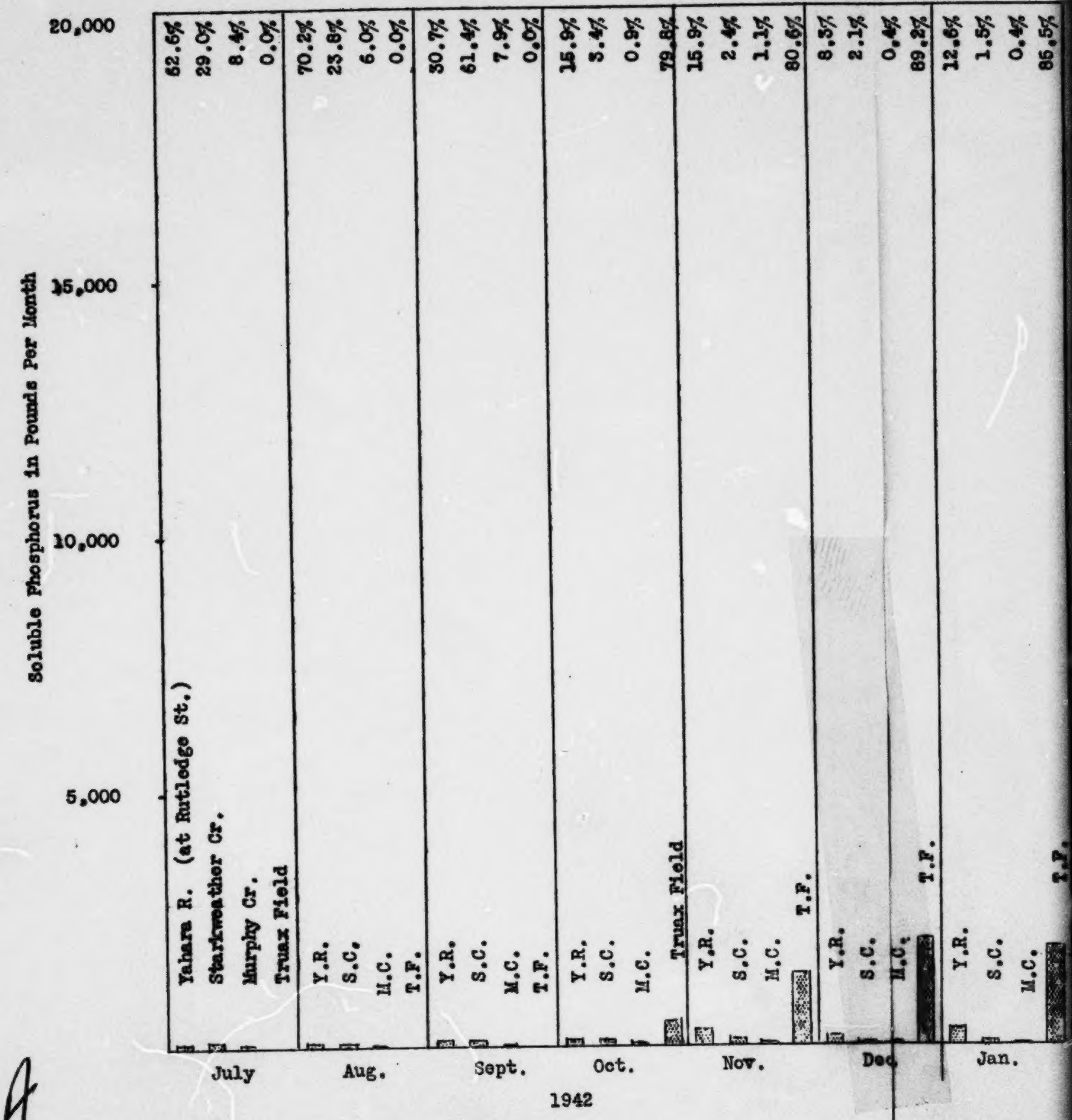

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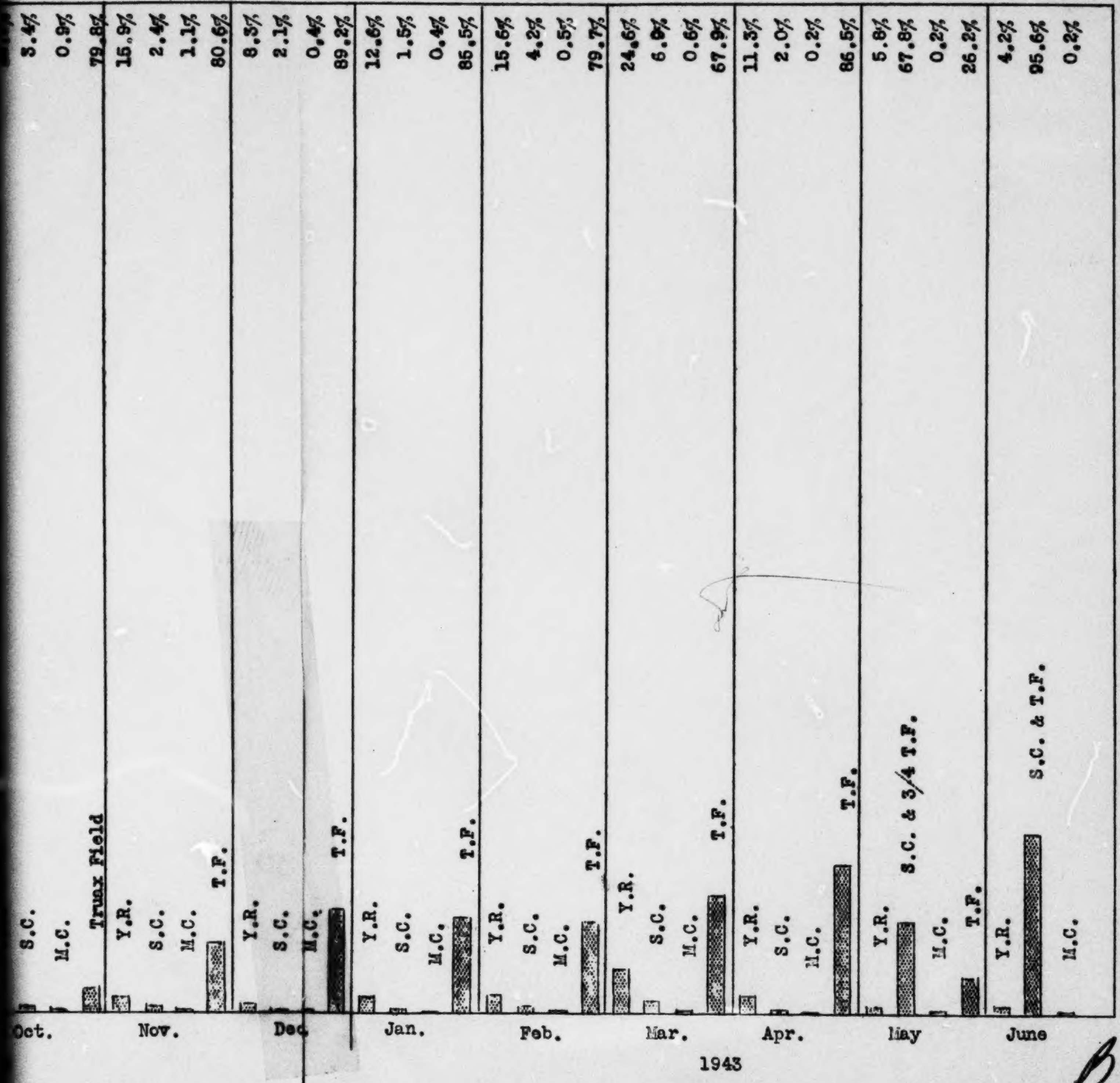
FIG. 3

LAKE MONONA

CONTRIBUTIONS OF SOLUBLE PHOSPHORUS



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nitrogen to the lake before Truax Field sewage effluent entered the lake was the Yahara River. The same held true for soluble phosphorus.

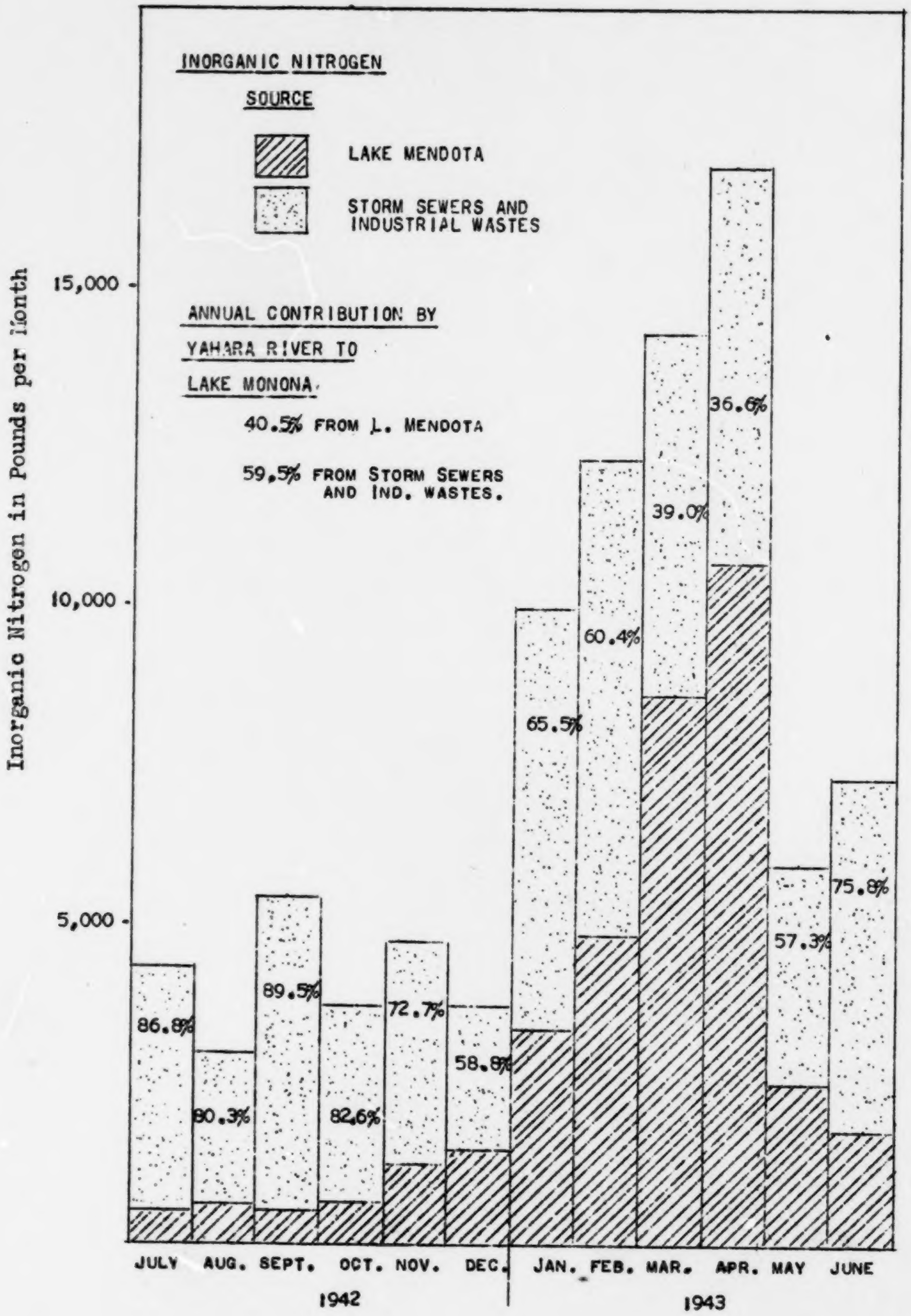
During the months of May and June, Starkweather Creek became the greatest contributor of both these fertilizing elements. This marked change was caused by diversion of the Truax Field sewage effluent from the outfall sewer emptying into the lake near the mouth of the Yahara River to Starkweather Creek, starting on the 9th day of May and continuing through the remainder of the survey.

Of the measured pollutional matter reaching the lake about 90% of the total suspended organic matter was contributed by the Yahara River and Starkweather Creek. Each contributed approximately equal quantities. The major portion of organic nitrogen was furnished by the Yahara River, 64.2%. These data are shown with data for the other lakes in Figs. 11 and 12.

The contribution of the Yahara River to Lake Monona should be broken down into its component parts, i.e., the part contributed by Lake Mendota and the part contributed by the sewers of the city. This is done in Fig. 4 for inorganic nitrogen and shows that the major portion, 59.5%, was derived from drainage from the city, a large part of which was delivered during the first four months of 1943. Since there was no storm water discharge during January, the importance of industrial waste pollution to the river is established. The industrial and storm sewer contributions to the river of soluble phosphorus were much less, being 11.4% for the year. Precipitation and sedimentation in the river may account to some extent for

FIG. 4

POLLUTION OF YAHARA RIVER IN MADISON



this value being so much lower than that for inorganic nitrogen. Of the suspended organic matter and organic nitrogen contributed by the Yahara River, the contributions by the sewers were 45.1 and 20.4%, respectively. Both of these values are known to be low, as sludge deposits are existent in the river below the Johnson Street bridge. Gasification was noted frequently.

Industrial Wastes

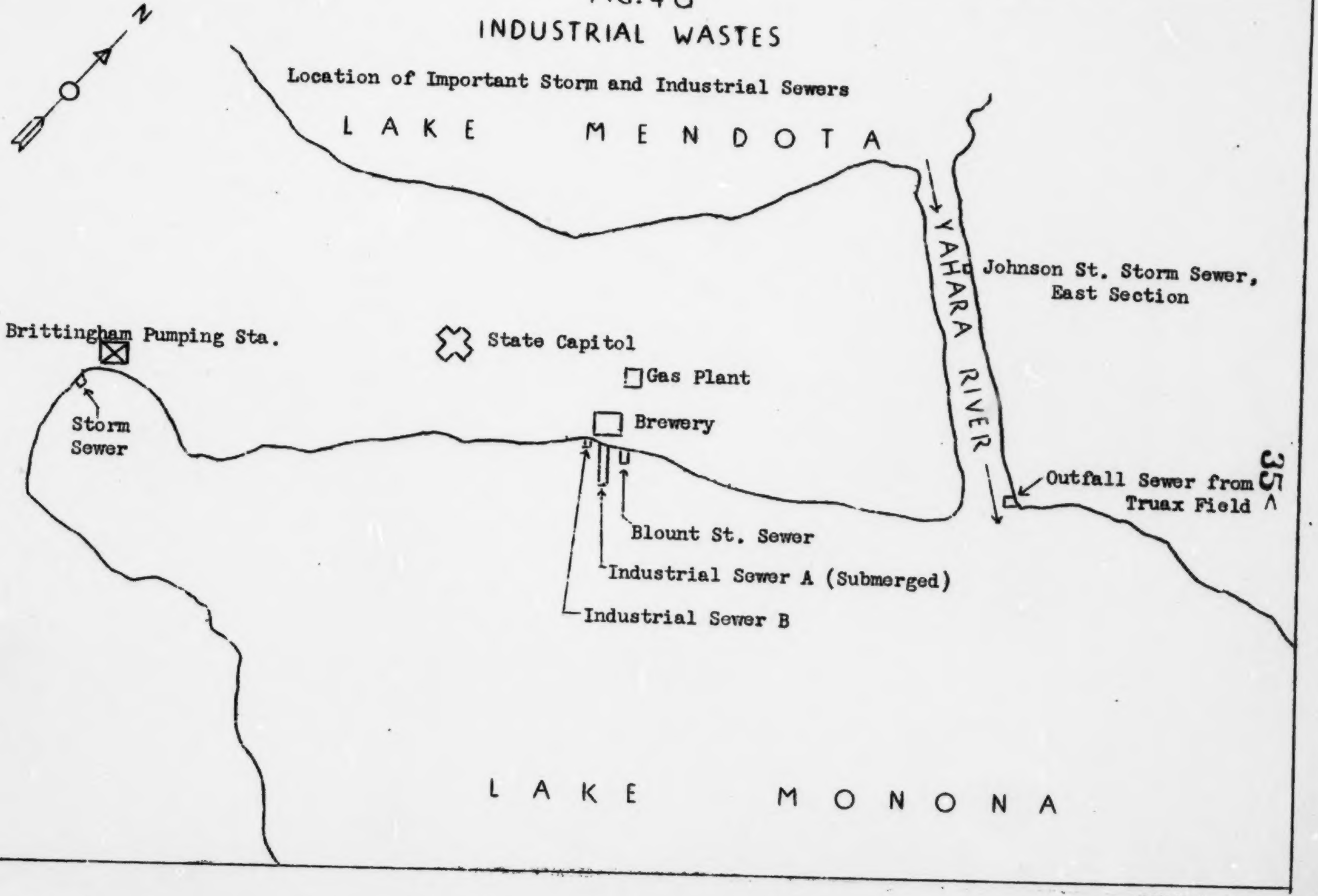
The pollution of Lake Monona by industrial wastes is rather severe, for a city served with sanitary sewers. Fig. 4a is a sketch of the city which shows the location of storm sewer outlets and industrial sewers which contribute the major quantities of waste.

East Johnson St. Sewer - East Section. This sewer serves a rather large area east and north of the Yahara River, and its contributions represent a large portion of pollution entering the Yahara River. Until the last of December, the effluent from this sewer was rather inoffensive and contained little suspended organic matter. Early in January the flow increased considerably and its nature changed markedly. The discharge had all the characteristics of raw sewage except that practically no particles of paper were present. Discharge of the same nature continued day after day. Occasionally large clumps of floating sludge emanated from the sewer. An investigation of the area served by the sewer resulted in the finding of a drainage ditch below the Oscar Mayer Packing Plant which drained into a special storm sewer inlet at the junction of Pennsylvania and Commercial Avenues. The waste in the ditch

FIG. 4a

INDUSTRIAL WASTES

Location of Important Storm and Industrial Sewers


N
LAKE MENDOTA
YAHARA RIVER
Johnson St. Storm Sewer, East Section
Brittingham Pumping Sta.
State Capitol
Gas Plant
Brewery
Storm Sewer
Outfall Sewer from Truax Field
Blount St. Sewer
Industrial Sewer A (Submerged)
Industrial Sewer B
LAKE MONONA

appeared to be of the same nature as the material flowing from the Johnson St. sewer; therefore, the flow of sewage was traced, from the special sewer inlet to the sewer mouth by the use of the dye fluorescein. The time of travel for the 1.2 miles was 2 hours and 50 minutes. The nature of the effluent from this sewer remained essentially the same throughout the first 4 months of 1943, and, no doubt, is the cause of the abnormally large contribution from storm sewers and industrial wastes shown in Fig. 4 during those same months.

Blount St. Storm Sewer - This sewer carries considerable waste material of inorganic and organic nature. Much of the inorganic matter is nitrogenous and, undoubtedly, stems from the local gas works. The water in the sewer is frequently covered with oily and tarry wastes with a definite gas house odor. The organic matter is mainly of carbohydrate nature as shown by chemical analysis and by the growth of filamentous bacteria on the sewer walls below the water level. The discharge from the sewer frequently has a high biochemical oxygen demand.

Industrial Sewer A - A submerged sewer which extends into the lake for a distance of about 30 feet and ends in approximately 3 feet of water is located just south of the Blount St. storm sewer opening and below the Fauerbach Brewery. The sewer, undoubtedly, serves the brewery, because during the winter months when there was no wave action a large mound of fermented grain accumulated aroumd the sewer mouth. Liquid wastes of high biochemical oxygen demand issue almost continuously from the sewer mouth. Cancelled malt liquor stamps were found in the waste.

Industrial Sewer B - This sewer terminates behind some rocks in the lake bank and is located approximately 125 ft. southwest of the opening of the Blount St. storm sewer. This sewer also serves a brewery and carries malt wastes of high organic and inorganic content. Frequently the samples are rather rich in phosphorus and high in biochemical oxygen demand. The flow is very spasmodic.

Storm Sewer in Monona Bay - This sewer opening is located near the Brittingham Park Sewage Station. Its chief contribution during the year was a large quantity of waste lubricating oil. This occurred during the period of ice cover and when the ice disappeared an oil slick developed along a good share of the Monona Bay shoreline.

Oil pollution is rather common. Most of the storm sewers carry quantities on occasion. The Yahara River within the city in quiet weather is normally flecked with oil patches.

Storm Water

A considerable number of samples were collected during the course of the year. Care was taken to obtain samples from sewers which were known to have no dry weather flow, in order to eliminate contamination by industrial wastes.

Representative analyses are given in Table I and from the data it can be concluded that the storm waters of the city do not add markedly to the inorganic nitrogen content of the lake water. The composition of such waters is quite similar to water taken from natural streams during periods of storm flow and the total volume probably would not exceed a continuous flow of 10 c.f.s. The contribution of soluble phosphorus,

TABLE I

CHEMICAL COMPOSITION OF STORM WATER SAMPLES IN P.P.M.

									1942	1943						Mean
	9-7	9-7	9-7	9-7	11-5	11-5	11-5	11-5	11-9	2-20	5-15	5-15	5-15	5-15	5-15	Value
Sol. Phos.	.31	.43	.22	.31	.42	.17	.26	.90	.20	.01	.26	.08	.11	.05	.11	.22
Org. Phos.	.13	.03	.10	.15	.52	.34	.22	.50	.60	1.35	.82	.82	.83	.73	.43	.56
NH_3 - N	.29	.29	.31	.28	.05	.04	.06	.07	.14	.38	.49	.09	.31	.28	.35	.28
Org - N	1.25	1.45	1.05	1.30	1.16	.64	.62	.51	1.30	3.20	2.50	1.54	1.68	1.30	.84	1.30
NO_2 - N	.01	.01	.01	.01	.01	.02	.01	.01	.03	.03	.04	.03	.05	.05	.04	.02
NO_3 - N	.24	.16	.14	.20	.08	.08	.08	.08	.08	.08	.06	.12	.18	.20	.26	.14
Susp. Solids	62.5	87.0	19.0	38.0	47.0	31.0	30.0	23.0	297.0	874.0	133.0	327.0	295.0	246.0	114.0	87.0
Vol. Susp. Solids	20.0	20.0	10.0	16.0	18.0	13.5	11.0	12.0	78.0	297.0	48.0	105.0	91.0	76.0	36.0	29.0
% Volatile	32	33	53	42	38	43	37	32	26	34	36	32	31	31	32	34

Interpretation -

Sol. Phos. - inorganic phosphorus or phosphate phosphorus
NH_3 - N - nitrogen in the form of ammonium compounds
NO_2 - N - nitrogen in the form of nitrites
NO_3 - N - nitrogen in the form of nitrates
Susp. Solids - solids removed by filtration through the standard Gooch crucible with asbestos mat.

however, would be an important addition as the content of phosphorus is about 10 times that of a normal stream water. The data shows a much higher content of soluble phosphorus in the samples collected during 1942 than during 1943. This may be due to the general practice of burning leaves in the streets during the fall months. Ashes from the burning of leaves are high in phosphorus content.

Domestic Sewage

The main contributions of domestic sewage in addition to the effluent from Truax Field are as follows:

1. Private sewer systems which drain to the lake.
2. By-passed sewage from the city sanitary sewers.

Many of the better class residences on Lake Monona which are in areas not served by the sewers of the Metropolitan Sewerage District have water carried sewerage systems and some drainage from these as well as from pit privies reaches the lake eventually. The quantity can be only roughly estimated by determining the number of lake shore residents at different seasons of the year. There are 254 lake shore residences on Lake Monona outside of the city limits. If we assume an average of three people per residence, the contributing population would be 762. Thus the maximum possible contribution from this source would be approximately 5% of that from Truax Field.

Raw sewage is by-passed from the city sewers into Lake Monona during periods of mechanical or prolonged electrical failure and during periods of heavy rainfall. The main exit for the sewage to Lake Monona is via the Burke Plant outfall sewer. The sewage enters this sewer at the No. 1 pumping station, located at Johnson and First Streets. The continued use of this sewer by the city was the main reason for abandonment of its use by the U. S. Army and transfer of the Truax Field sewage effluent to Starkweather Creek.

Garbage and Refuse

The disposal of garbage and refuse into Lake Monona and the streams tributary to it is rather common practice. The City of Madison itself has not been above reproach, for, certainly, the conditions around the land fill along the city shore have been a poor example for its citizens. Notable examples of what is being added to the waters are;

1. The viscera, heads, and skins of eleven rabbits noted in the Yahara River near East Main St.
2. One dead dog noted floating down Starkweather Creek.
3. A two to three pound piece of meat in a bad state of preservation taken from the West Branch of Starkweather Creek.
4. Junk.
5. Kitchen garbage.
6. Lawn clippings.

B. LAKE WAUBESA

Sources of Pollution and Fertilization

The main sources of fertilizing minerals and pollutional matter entering Lake Waubesa are as follows:

1. Effluent from Lake Monona
2. Madison Sewage Plant Effluent
3. Nine Springs Creek
4. Swan and Clemans Creek
5. Industrial Wastes
6. Domestic Sewage
7. Other Unnatural Drainage
8. Garbage and Refuse

Contributions from the Various Sources

The contributions from the first 5 sources were determined by actual measurements and/or from information which allowed calculation of the contribution. The flow out of Lake Monona was calculated. Most of the sources of industrial wastes are located on Nine Springs Creek and, therefore, are included in the data obtained on that stream. It is estimated that 85% of the nutritive matter entering Lake Waubesa was under measurement during the year.

A summary of the data obtained on fertilizing minerals is given in Figs. 5 and 6. From these data it will be seen that the largest and most consistent contributor of inorganic nitrogen and soluble phosphorus was the Madison Sewage Plant.

The percentage contribution of inorganic nitrogen from this source varied from a minimum of 49.3 in March to a maximum of 96.9 in August. The percentage equaled or exceeded 90 during July, August, September, October and June. During the year, 76.9% of the total originated from this source. The percentage contribution of

FIG. 5

LAKE WAU

MEASURED CONTRIBUTIONS OF

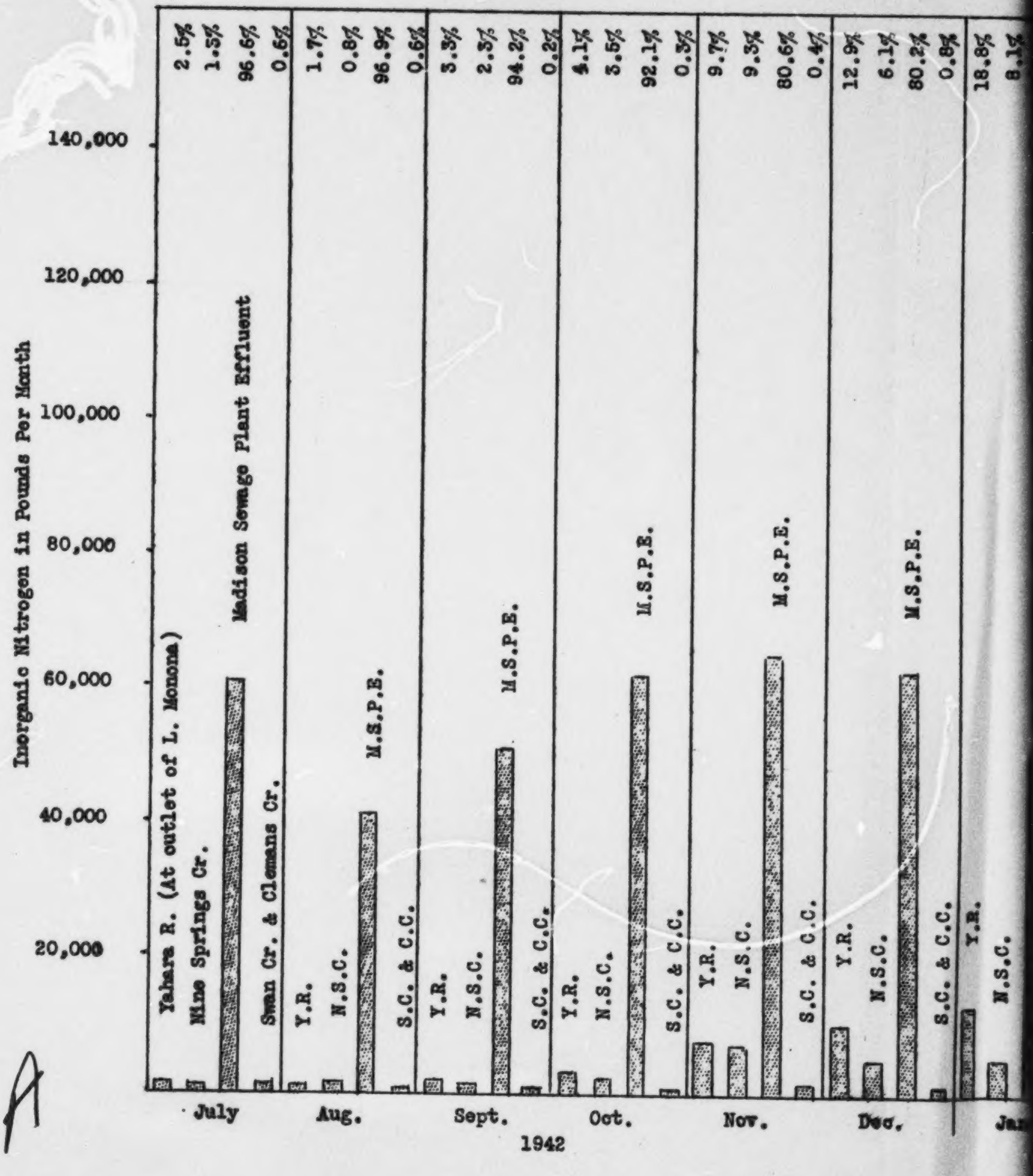


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FIG. 5

LAKE WAUBESA

CONTRIBUTIONS OF INORGANIC NITROGEN

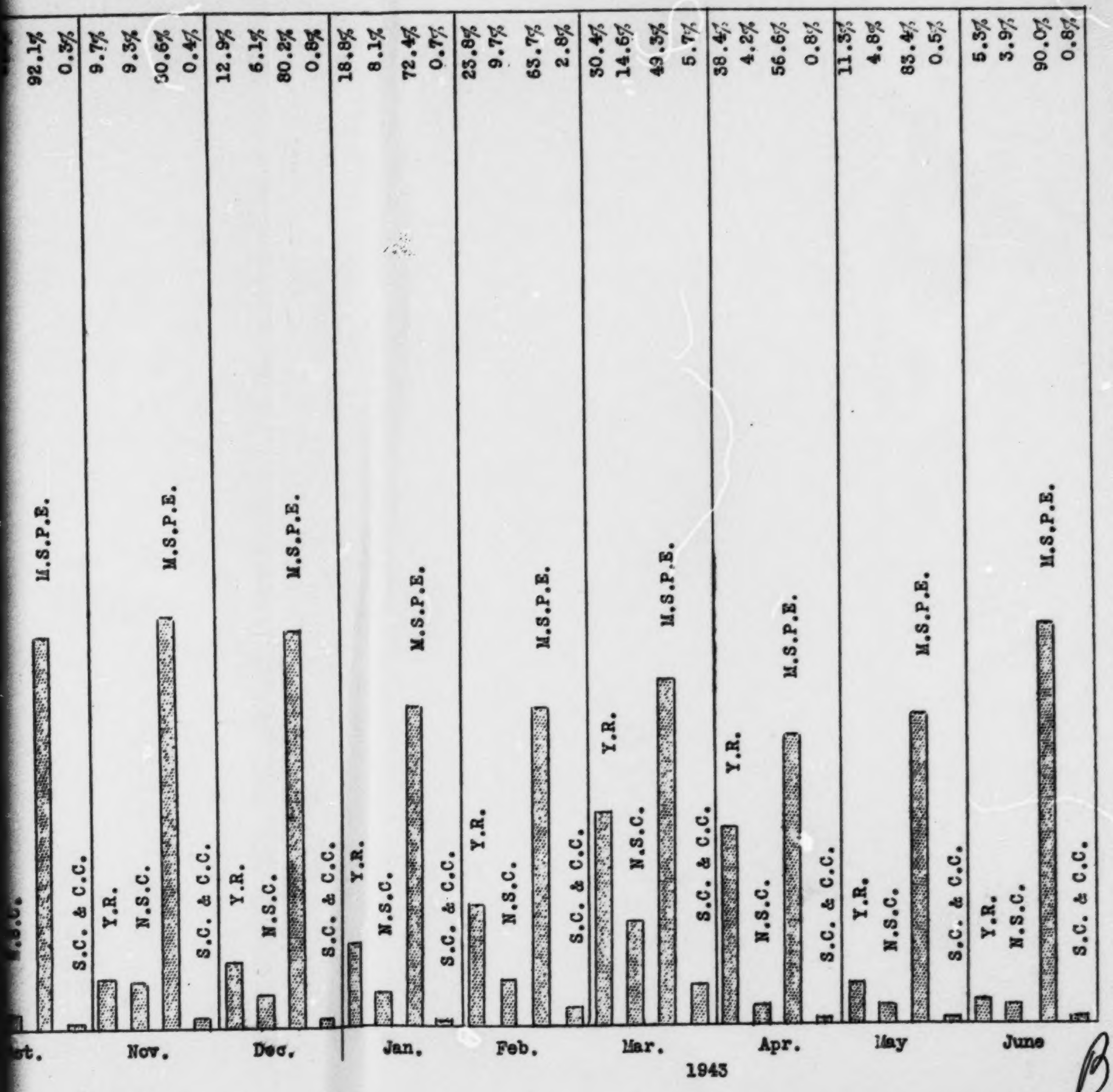

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FIG. 6

LAKE WAUBES

MEASURED CONTRIBUTIONS OF SOL

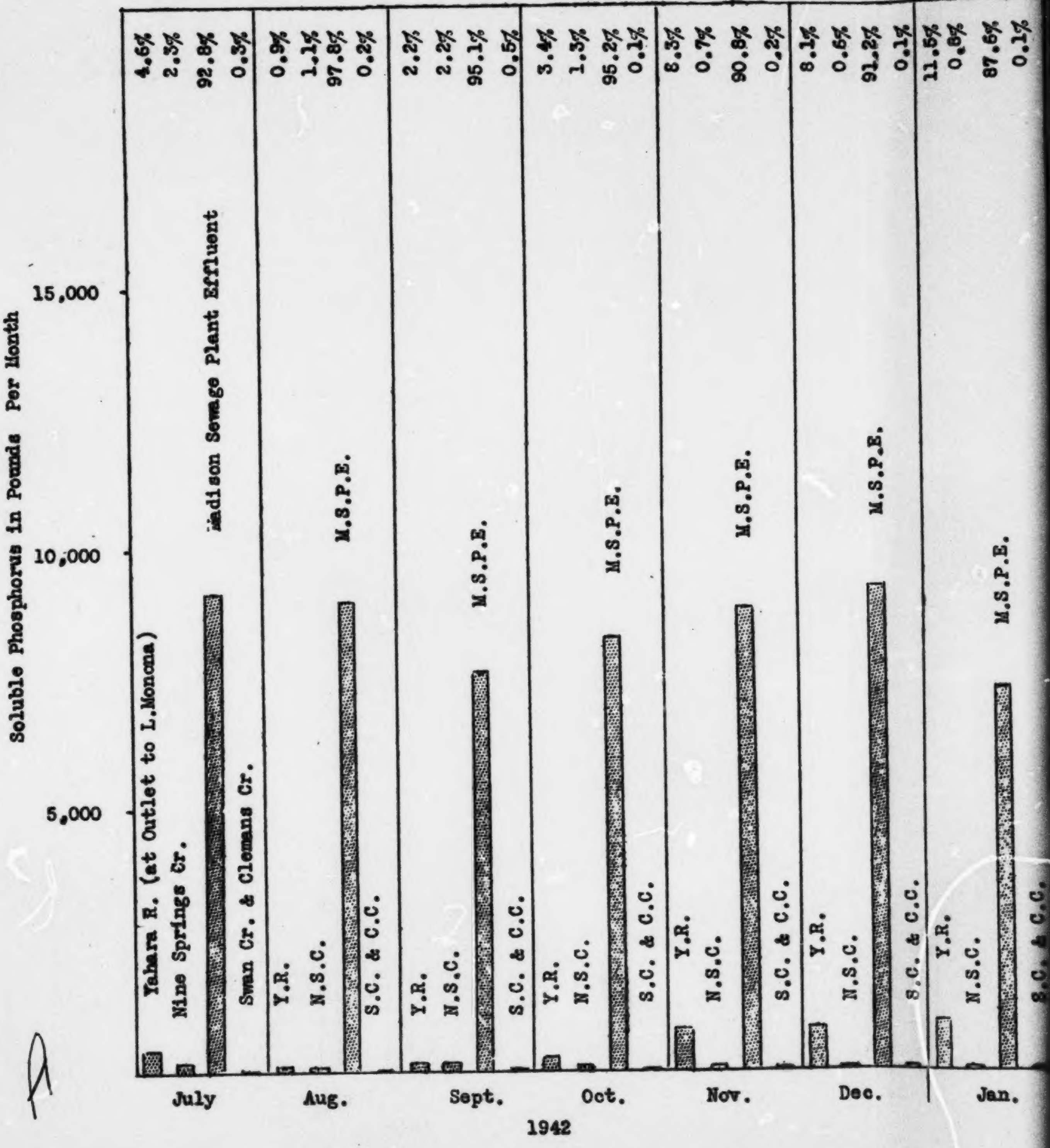

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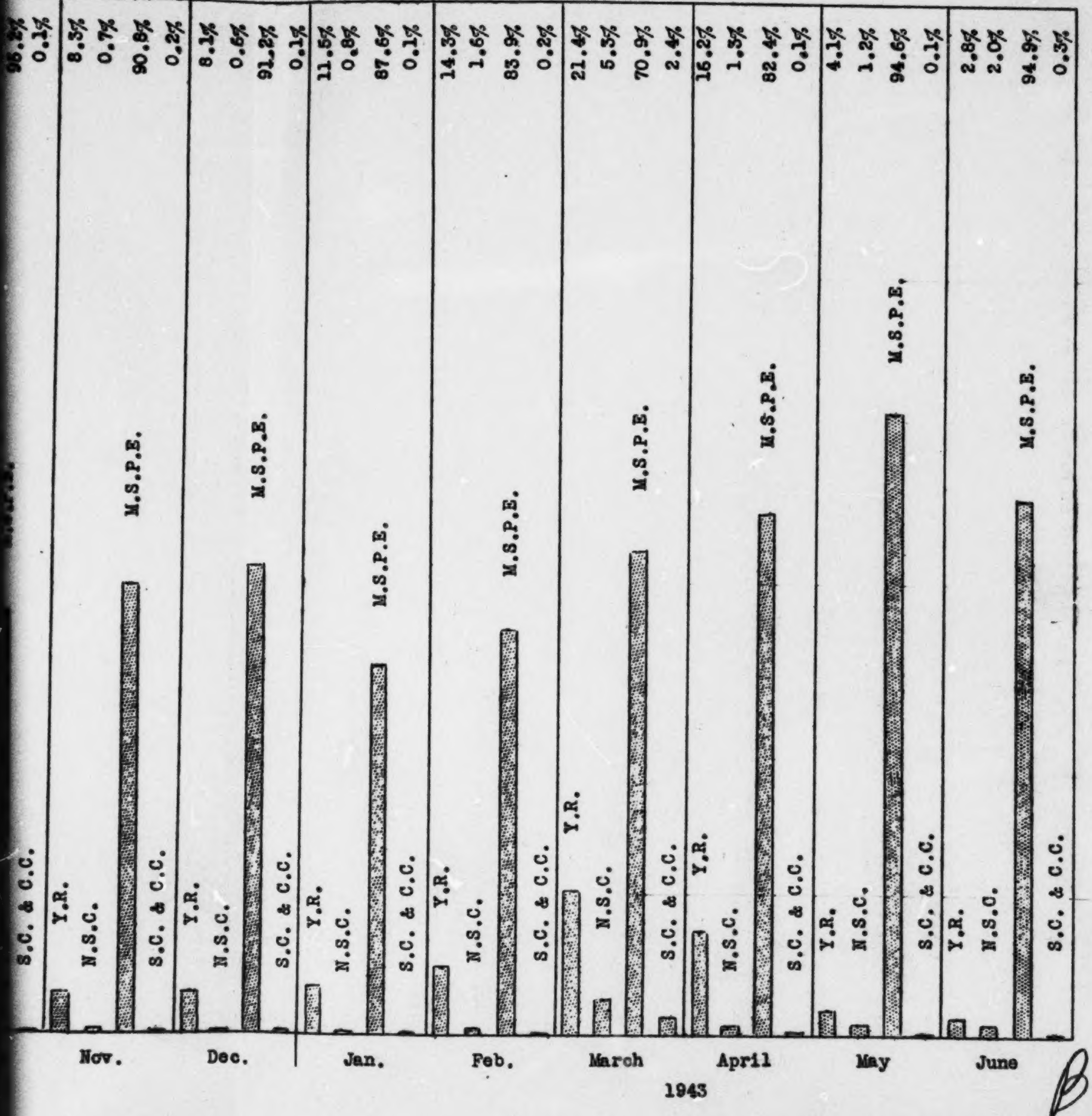
FIG. 6

LAKE WAUBESA

CONTRIBUTIONS OF SOLUBLE PHOSPHORUS



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soluble phosphorus varied from a minimum of 70.9 to a maximum of 97.8 and averaged 89.2% during the year. During January, February, March, and April, the contribution dropped below 90%.

The Yahara River carrying effluent water from Lake Monona was an important source of fertilizing matter during the winter months but was relatively unimportant during the summer months. The creeks, also, were much heavier contributors during the winter and spring months. Swan and Clemans Creeks were such minor factors that their contribution can be ignored.

The contributions of pollutional matter are shown in Figs. 11 and 12. It will be noted that nearly twice the quantity of suspended organic matter was received from Lake Monona than was received from the Madison Sewage Plant. The greatest contributor of organic nitrogen was the effluent water from Lake Monona. Its contribution was 59.4% of the total and that from the sewage plant effluent was 31.5% of the total.

Industrial Wastes

There are two main sources of industrial wastes tributary to Lake Waubesa. One is the Bowman Dairy which releases dairy wastes to Nine Springs Creek. These wastes enter the creek untreated and, in addition to having a rather high B. O. D. on occasion, are consistently high in soluble phosphorus, which is, undoubtedly, derived from the detergents used in the plant.

The second source of industrial waste is the rendering plant located near Nine Springs Creek just off the Oregon Road. Its wastes have a putrid odor, are high in nitrogen content, and have a high B. O. D. Both of these wastes are included in the contribution attributed to Nine Springs Creek.

Domestic Sewage

During the course of the survey no untreated sewage was found in the effluent from the Madison Sewage Plant. A total of 116 separate samples were tested and the results showed the effluent to be of better quality on an average than the effluents produced by plants of similar design and facilities operating in the U.S.

There are 512 cottages on or near Lake Waubesa. Most of these are serviced with ordinary privies. The contribution of fertilizing minerals can be only approximated. During the month of February 229 of the cottages were occupied. Assuming that there are three people per cottage, this would mean a maximum residential population of 1536 and a minimum of 687 with an annual average of about 970. The total contribution from such a number would be less than one per cent of the present total input to the lake.

Other Unnatural Drainage

There are two sources of unnatural drainage. They are both related to the current sludge disposal practices at the Madison Sewage Plant. Drainage from the sand beds flows into a small drainage ditch and eventually into the effluent canal at the outfall sewer. This flow is spasmodic and difficult to measure and evaluate. Considerable quantities of digested sludge are disposed of on the marsh area east of the plant site. Drainage from this area is to Nine Springs Creek via a drainage ditch. Samples from the drainage ditch submitted to chemical analysis showed the water to be very high in phosphorus and inorganic nitrogen contents. No attempt was made to evaluate the quantity of fertilizing minerals reaching the lake from this source.

Garbage and Refuse

The disposal of garbage and refuse into the waters of this area is rather extensive. Residents along the river, especially between Black and Interlake bridges, seem to depend on the river for disposal. Kitchen garbage and lawn clippings are most common.

C. LAKE KEGONSA

Sources of Pollution and Fertilization

The main sources of fertilizing minerals and pollutional matter entering Lake Kegonsa are as follows:

1. Effluent from Lake Waubesa as modified by Mud Lake
2. Door Creek
3. Williams Creek
4. Halversons Creek
5. Domestic sewage
6. Garbage and Refuse

Contributions from the Various Sources

The contributions from the first 4 sources were measured and the results obtained for fertilizing elements are shown in Figs. 7 and 8. It is estimated that 90% of the total contributions to the lake were under measurement during the course of the survey. Reference to the charts shows that the Yahara River and Door Creek are the main contributors of inorganic nitrogen and soluble phosphorus. The major portion of their contribution occurs during the winter months, November to April. Over the course of the year, the Yahara contributed 67.2% of the total amount of inorganic nitrogen and 98.2% of the soluble phosphorus; Door Creek contributed 27.2% of the inorganic nitrogen and 1.4% of the soluble phosphorus. Williams and Halversons Creeks were negligible contributors.

The relative amounts of pollutional matter entering Lake Kegonsa during the year are shown in Figs. 11 and 12. These charts show that 90.0% of the suspended organic matter and 88.6% of the organic nitrogen were contributed by the Yahara River. Door Creek was second with 8.7 and 10.3% respectively. Again Williams and Halversons Creeks were negligible contributors.

FIG. 7

LAKE KEGC

MEASURED CONTRIBUTIONS OF IN

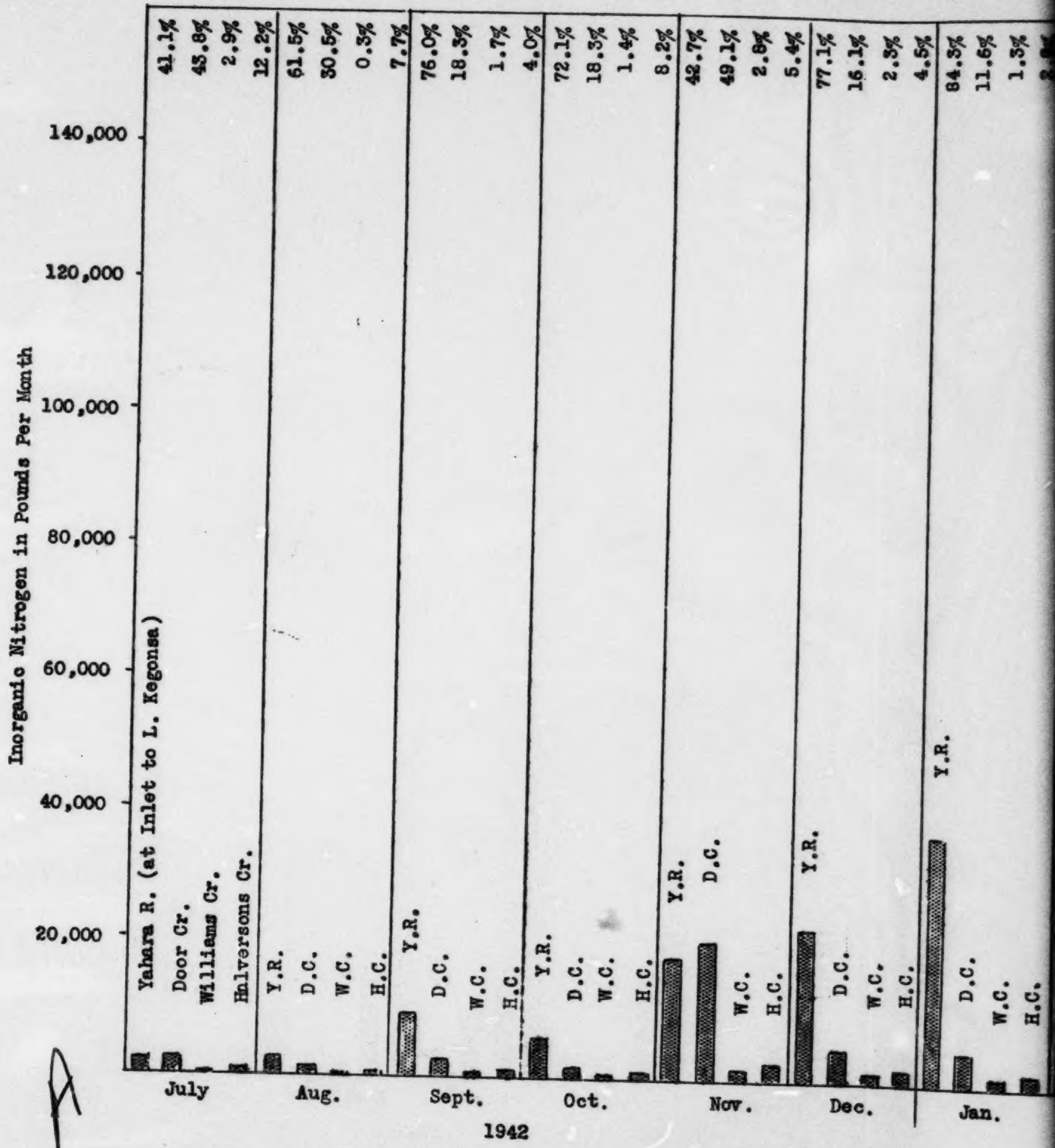

FIG. 7

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LAKE KEGONSA

CONTRIBUTIONS OF INORGANIC NITROGEN

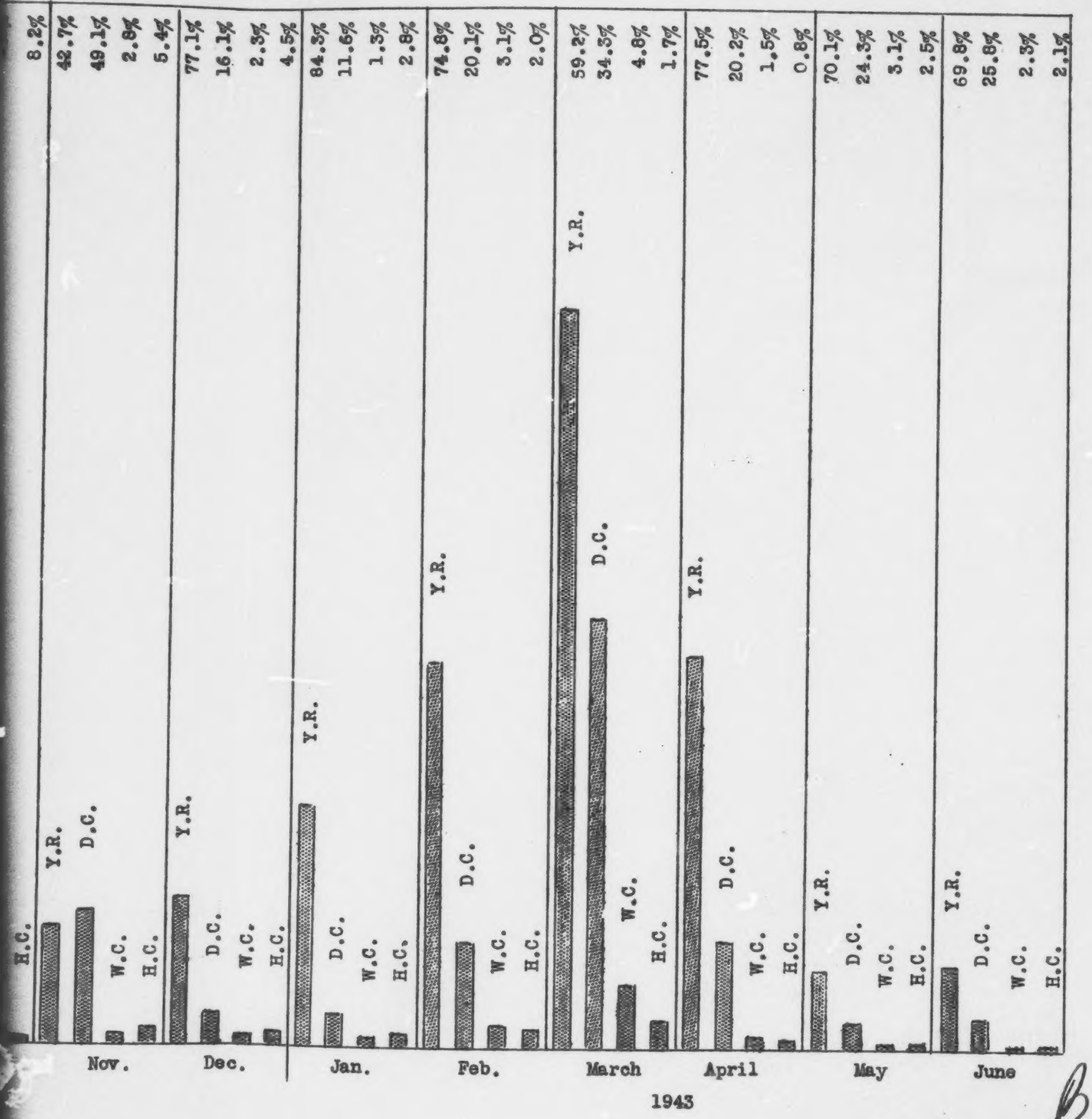


FIG. 8

LAKE KEGO

MEASURED CONTRIBUTIONS OF SOL

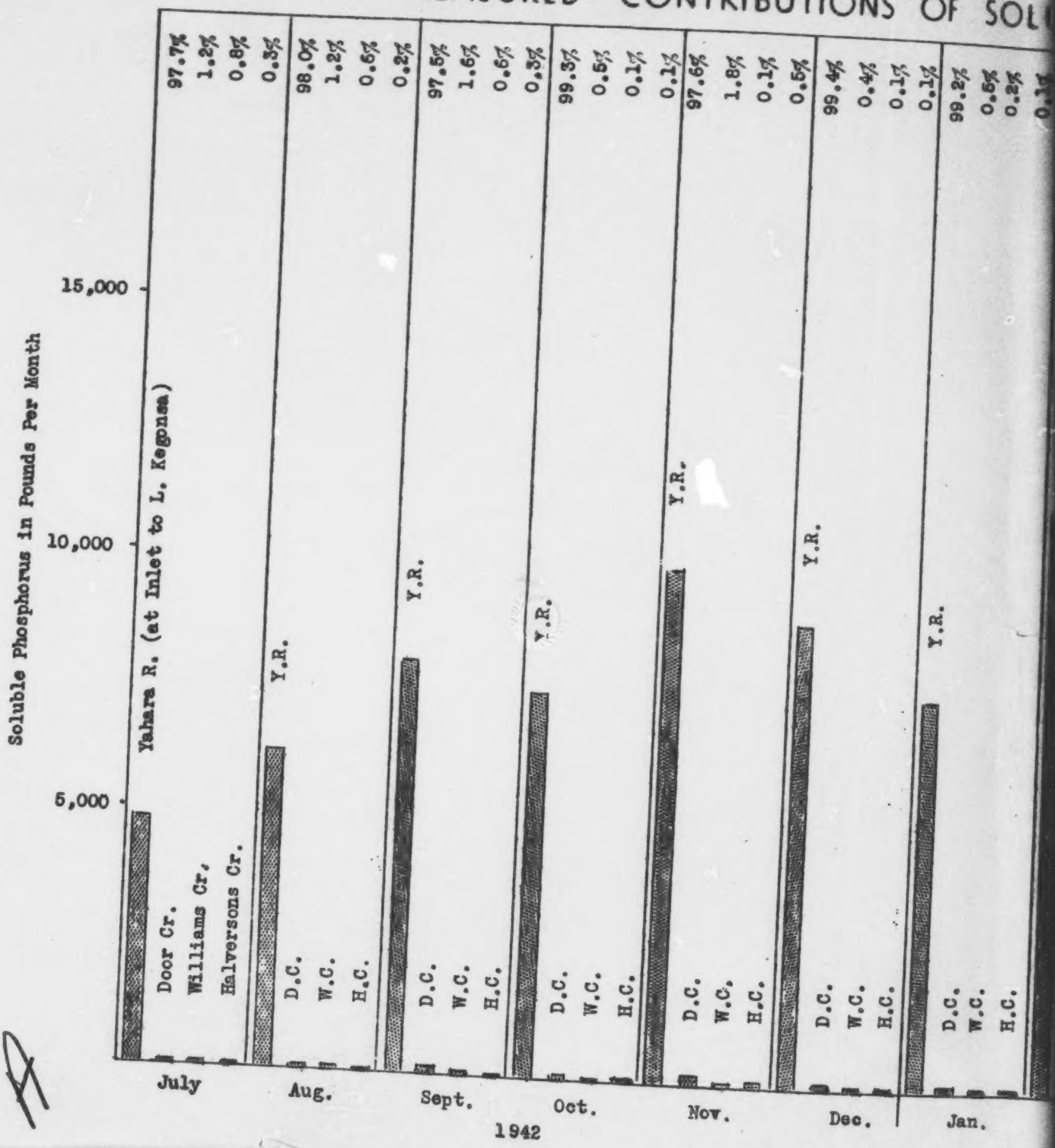
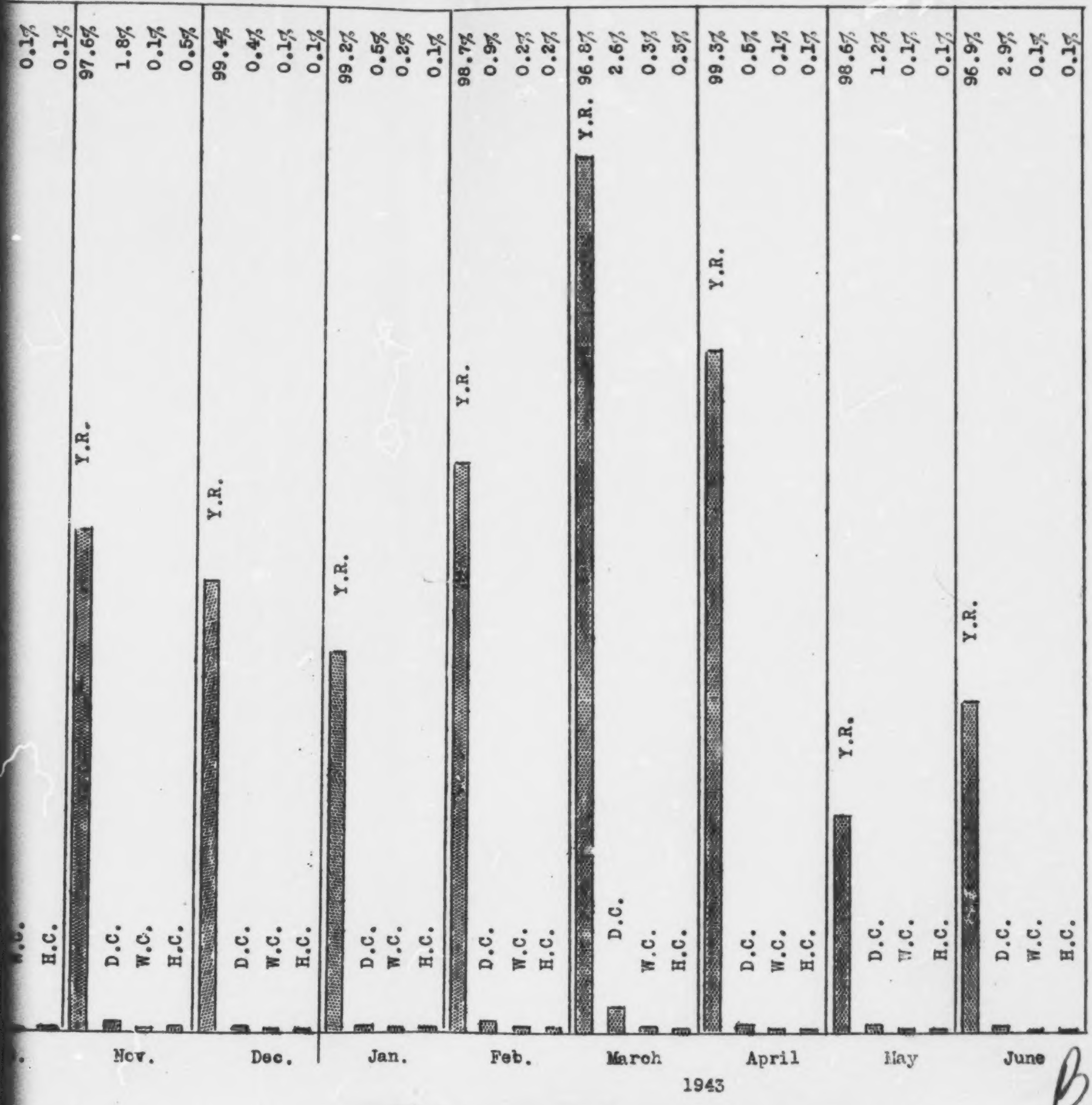


FIG. 8

LAKE KEGONSA

CONTRIBUTIONS OF SOLUBLE PHOSPHORUS



B

Domestic Sewage

The main source of domestic sewage is from the cottages, and business establishments near the lake shore or its tributaries. Most of the 413 cottages are served by privies. During January, 60 of the cottages were occupied. Assuming three persons per cottage, the average population throughout the year would be about 433 people. The contribution from such a small number of people would be negligible when compared to the present loading on the lake.

Garbage and Refuse

Lake Kegonsa suffers the least of any of the lakes from garbage and refuse disposal. No flagrant violations were noted, although complaints were solicited from cottage owners.

D. RELATIVE POLLUTION AND FERTILIZATION OF LAKES MONONA, WAUBESA AND KEGONSA

Inorganic Nitrogen

The relative and actual quantities of this fertilizing element contributed from each source during the year are shown in Fig. 9.

Of the 254,028 lbs. contributed to Lake Monona, nearly equal quantities came from the Yahara River, Starkweather Creek, and Truax Field. During the year, the loading on Lake Monona amounted to 46,650 lbs. per sq. mi. of lake area.

The total contribution to Lake Waubesa was 859,113 lbs. The effluent from the Madison Sewage Plant furnished 76.9% of this total, the Yahara River 15.3% and Nine Springs Creek 6.4%. The loading on Lake Waubesa was 270,000 lbs. per sq. mi. of lake area.

A total of 527,014 lbs. entered Lake Kegonsa. The Yahara River furnished 67.2% and Door Creek 27.2% of this total. The loading on Lake Kegonsa was 107,600 lbs. per sq. mi. of lake area.

Soluble Phosphorus

The relative and actual quantities contributed from each source during the year are shown in Fig. 10.

A total of 23,072 lbs. were contributed to Lake Monona. Truax Field, during 6 3/4 months, contributed 59.8% of this amount. Starkweather Creek which carried Truax Field sewage plant effluent during the last three weeks of May and all of June contributed 26.7%. The loading on Lake Monona was 4,250 pounds per square mile of lake area.

FIG. 9

ANNUAL CONTRIBUTIONS OF INORGANIC NITROGEN

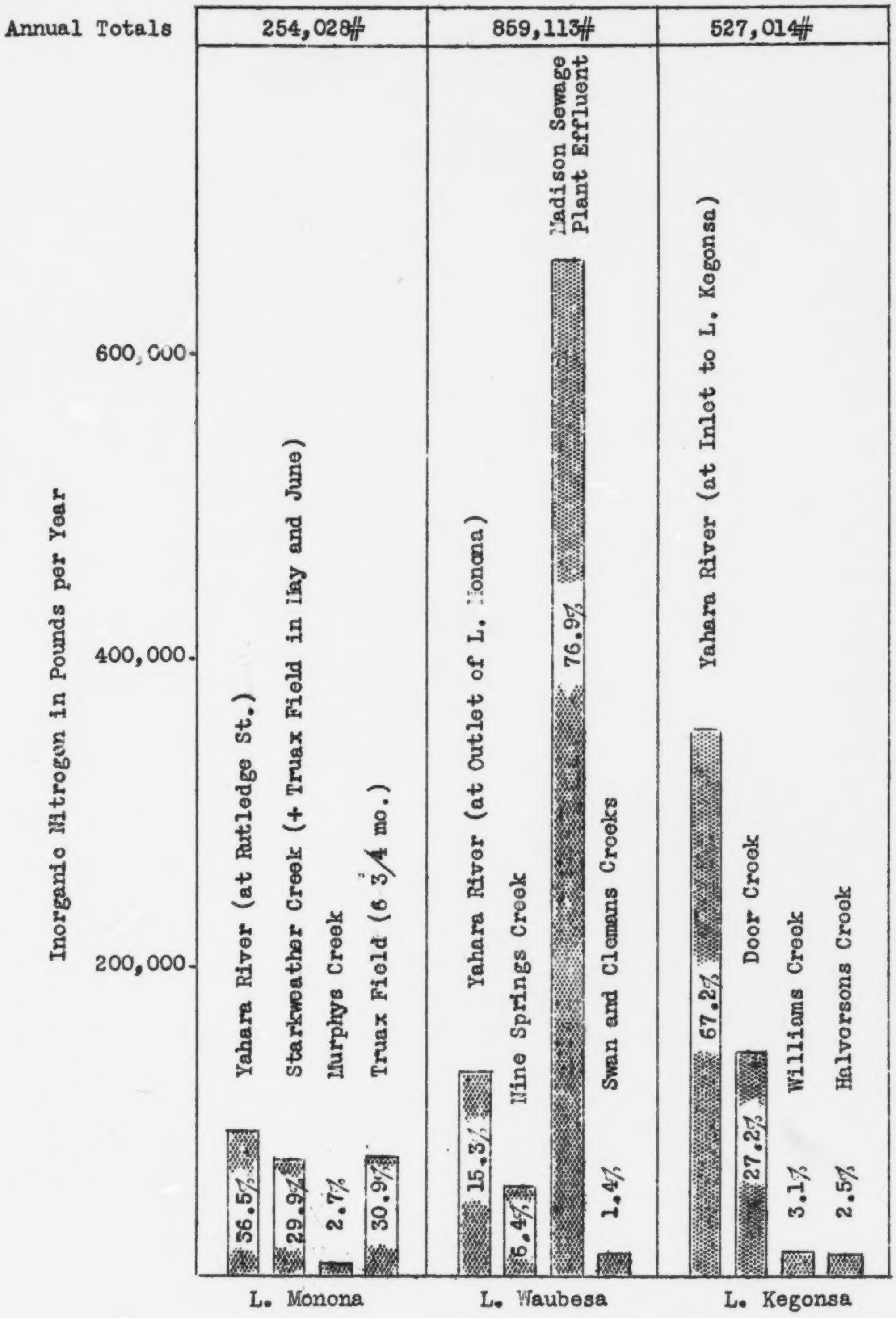
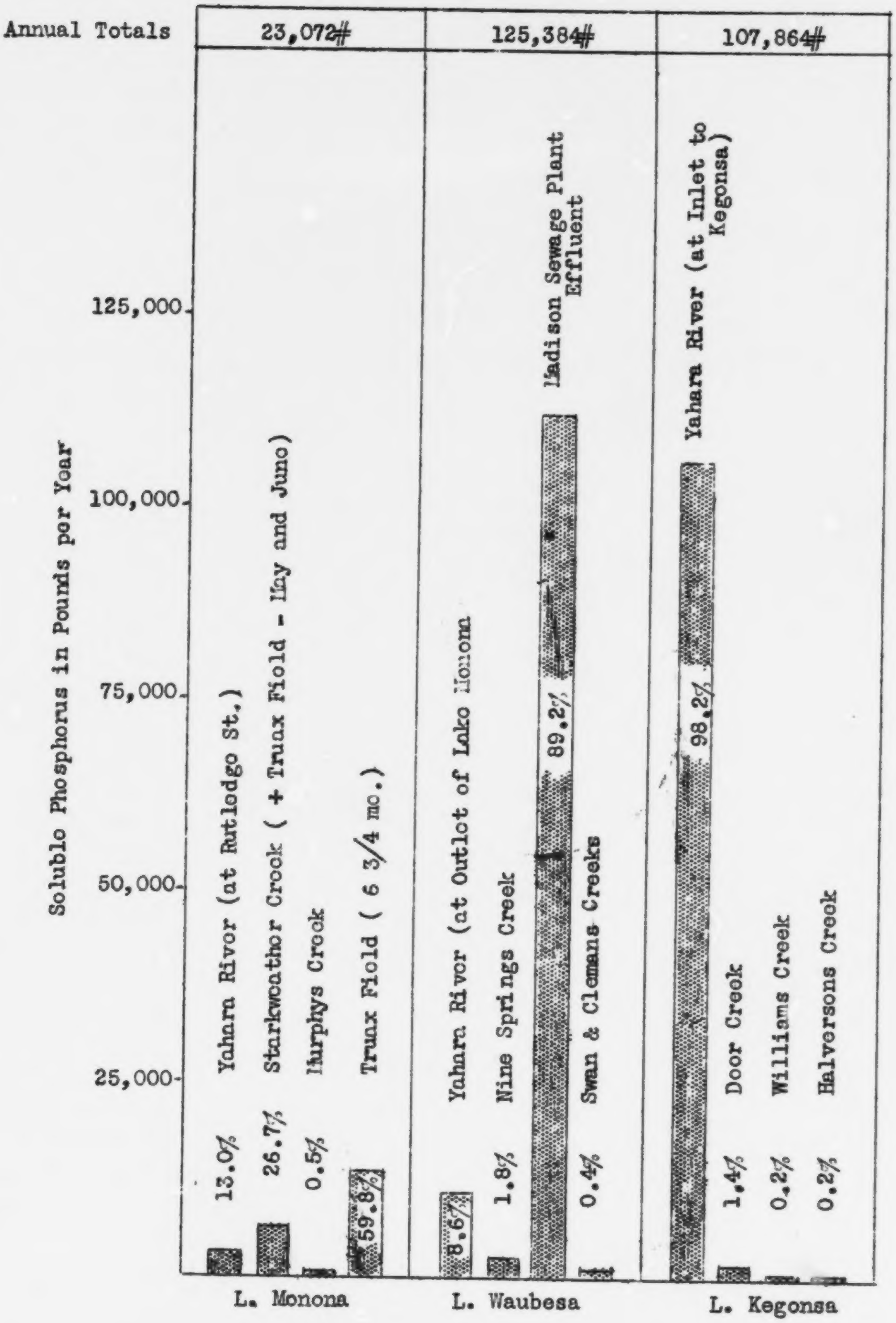


FIG. 10

ANNUAL CONTRIBUTIONS OF SOLUBLE PHOSPHORUS



The total contribution to Lake Waubesa was 125,384 lbs. Of this total, 89.2% originated from the Madison Sewage Plant, 8.6% from the Yahara River and 1.8% from Nine Springs Creek and the industries tributary to it. The loading on Lake Waubesa was 39,500 lbs. per sq. mi. of lake area.

The total contribution to Lake Kegonsa was 107,864 lbs. The Yahara River contributed 98.2% of this total. The loading on Lake Kegonsa was 22,000 lbs. per sq. mi. of lake area.

Suspended Organic Matter

Fig. 11 shows the annual contribution of this form of pollution from all sources.

A total of 1,734,618 lbs., or 867 T., were contributed to Lake Monona. Of this total, 46.4% were derived from the Yahara River and 44.4% from Starkweather Creek. The loading on Lake Monona was 159 T per sq. mi. of lake area.

The total contribution to Lake Waubesa was 1,859,437 lbs., or 930 T. The Yahara River contributed 53.4% of this total, Nine Springs Creek 13.1%, and the Madison Sewage Plant 31.9%. The loading on Lake Waubesa was 292 T. per sq. mi. of lake area.

The contribution to Lake Kegonsa totaled 2,811,431 lbs. or 1,406 T. Of this total, the Yahara River donated 90.0% and Door Creek 8.7%. The loading on Lake Kegonsa was 287 T. per sq. mi. of lake area.

Organic Nitrogen

Fig. 12 shows the annual contribution of this form of pollution from all sources.

FIG. 11

ANNUAL CONTRIBUTIONS OF SUSPENDED ORGANIC MATTER

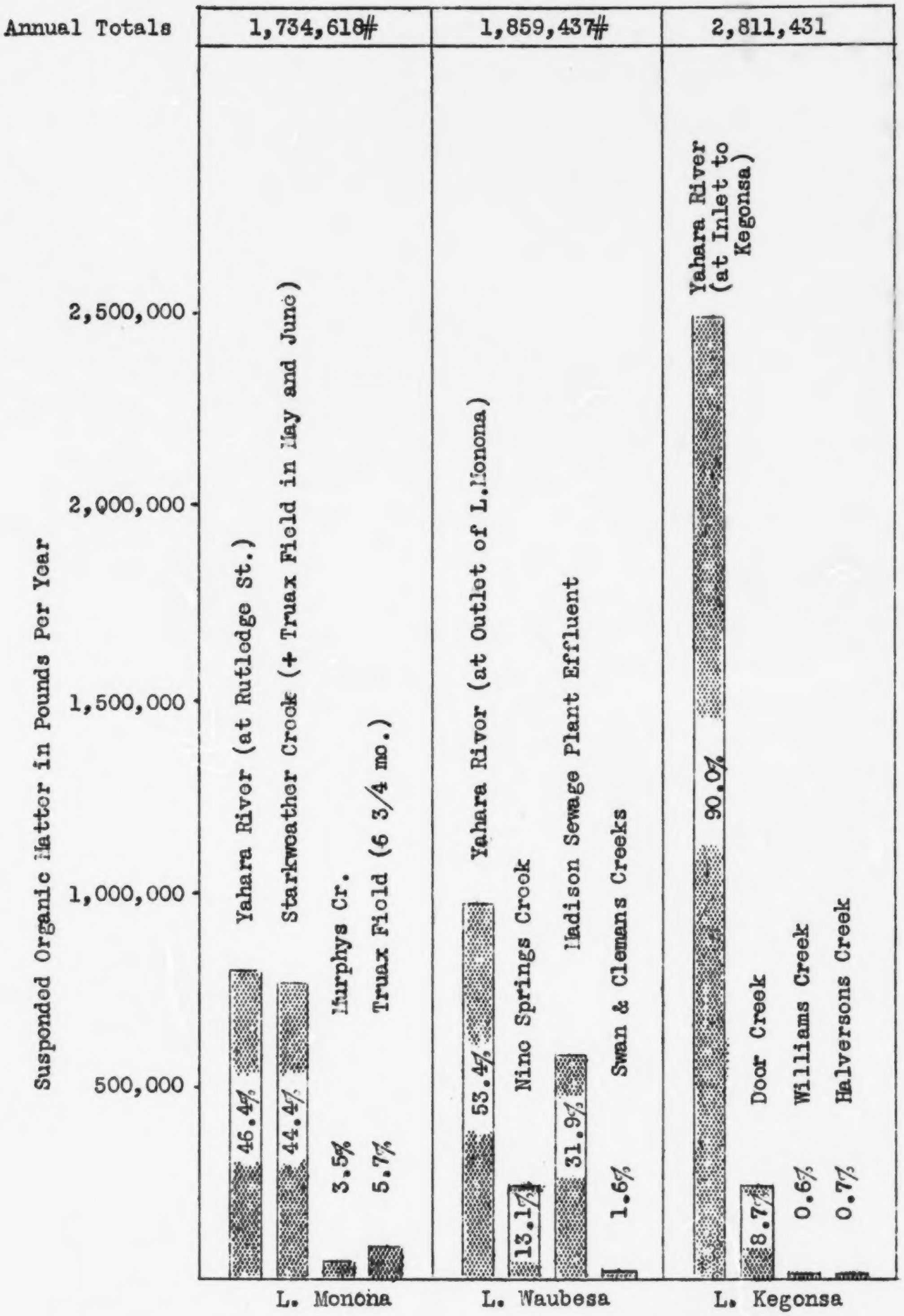
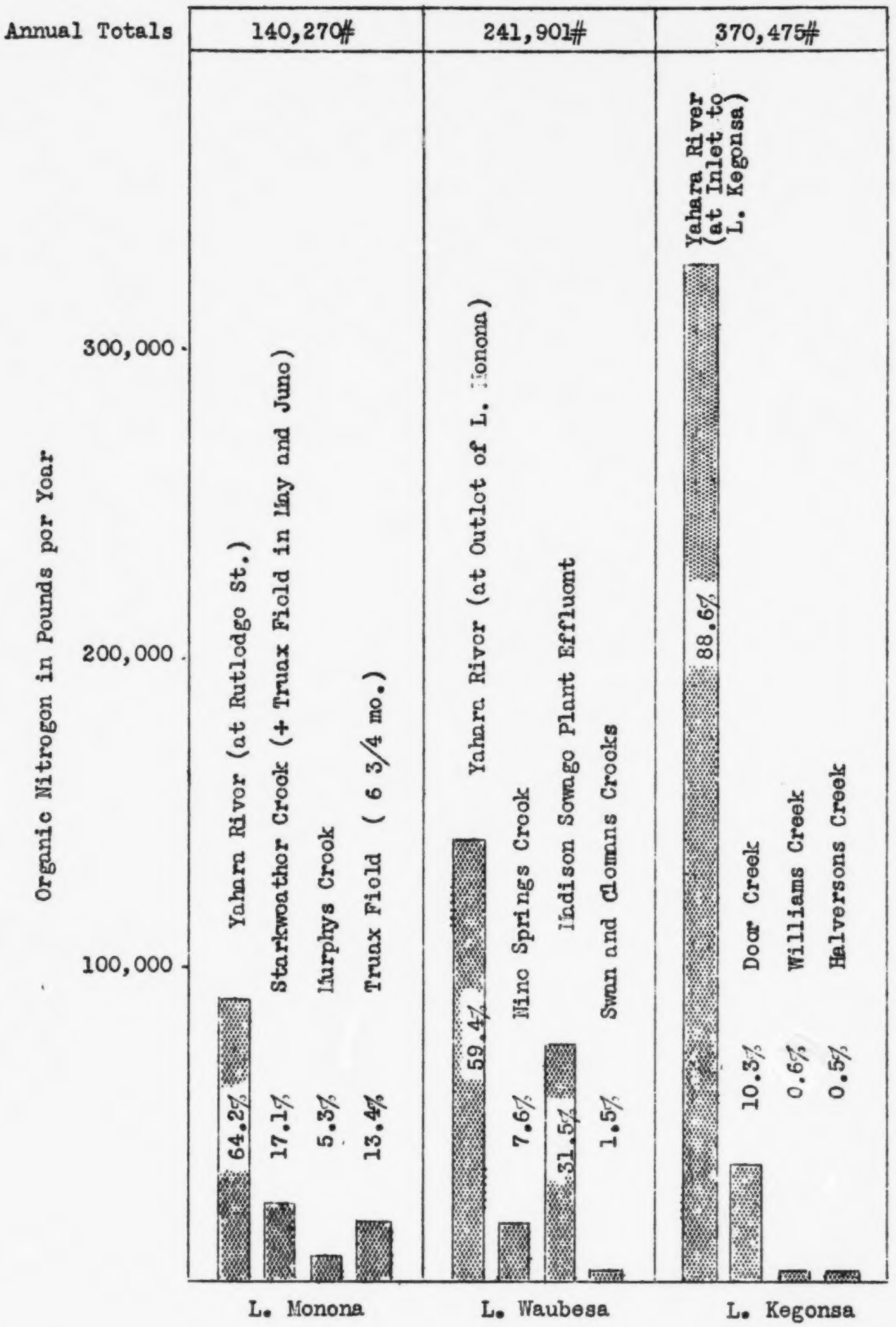


FIG. 12

ANNUAL CONTRIBUTIONS OF ORGANIC NITROGEN



A total of 140,270 lbs. was contributed to Lake Monona. The Yahara River furnished 64.2%, Starkweather Creek 17.1%, and Truax Field, in 6 3/4 months, 13.4%. The loading on Lake Monona was 26,300 lbs. per sq. mi. of lake area.

A total of 241,901 lbs. was contributed to Lake Waubesa. The Yahara River donated 59.4%, the Madison Sewage Plant effluent 31.5% and Nine Springs Creek 7.6%. The loading on Lake Waubesa was 76,200 lbs. per sq. mi. of lake area.

Lake Kegonsa received a total of 370,457 lbs. The Yahara River furnished 88.6% of this total and Door Creek 10.3%. The loading on Lake Kegonsa was 75,600 lbs. per sq. mi. of lake area.

E. OTHER FERTILIZING ELEMENTS

Potassium

The determination of potassium was not done on routine samples, but was run on samples composited from the routine samples during the months of August, September, October, December, March, and June. The results are shown in Table II. From these data we note that the normal stream waters contain from 1.0 to 2.0 p.p.m. of potassium as a general rule. The average concentration in the effluents from Lakes Mendota, Wingra, Monona, Waubesa and Kegonsa were 1.70, 1.43, 1.87, 2.55 and 2.21 respectively. The effluent from the Madison Sewage Plant averaged 10.0 p.p.m. and the potassium content of the water in the West Branch of Starkweather Creek increased from an average of 2.02 p.p.m. to 8.00 p.p.m. after Truax Field sewage effluent was admitted to it.

Sulfur

Analysis for sulfates was made on one set of composited samples. The results are shown in Table II, also, and indicate that all the waters are relatively rich in this element. The concentration in the Madison Sewage Plant effluent was considerably higher than in the normal stream waters.

TABLE II

POTASSIUM AND SULFUR

CONTENT OF LAKE AND TRIBUTARY WATERS

P.P.M.

Source	Potassium						Sulfates
	Aug. 1942	Sept. 1942	Oct. 1942	Dec. 1942	Mar. 1943	June 1943	Oct. 1942
L. Mendota	--	1.45	--	1.80	2.00	1.55	
Yahara R. at Rut. St.	1.65	1.70	2.05	1.55	2.50	2.00	27.6
Stark Cr. E.	1.70	1.75	1.10	0.95	2.75	0.75	18.5
Stark Cr. W.	1.70	2.30	2.30	1.30	2.20	8.00	94.8
Murphy Cr.	1.35	1.25	1.50	1.40	1.70	1.40	24.0
L. Monona	1.90	1.75	1.70	2.05	1.90	1.90	30.2
Nine Sp. Cr.	1.15	2.65	1.10	1.10	1.90	0.95	20.8
Sewage Canal	8.50	9.50	9.25	10.75	8.25	9.25	48.2
Nine Spr. Cr.(combined)	8.13	6.00	8.20	8.15	6.00	7.50	41.2
Madison Sewage Plant Effluent	9.75	9.75	10.00	11.65	9.50	9.25	47.6
Yahara R. at Inlet to Waubesa	3.10	3.60	00	3.00	2.60	3.50	--
Clemans Cr.	1.33	2.60	2.70	1.45	1.95	1.10	13.7
Swan Cr.	1.00	2.70	2.50	2.90	1.80	0.80	20.0
Yahara R. at Outlet of Waubesa	2.80	3.00	2.50	1.50	2.60	2.90	--
Yahara R. at Inlet to Kegonsa	3.00	3.60	2.80	3.20	2.80	2.50	28.0
Door Cr.	1.15	2.10	1.25	1.15	1.95	1.00	35.0
Williams Cr.	0.90	2.10	1.50	1.05	1.50	0.85	62.0
Halversons Cr.	1.25	2.60	1.15	2.65	1.65	1.20	14.4
Yahara R. at Outlet of Kegonsa	2.25	2.20	2.40	1.50	2.50	2.40	26.6
Storm Sewer		2.50	3.40				

F. TRUAX FIELD SEWAGE

In fairness to the Army officials of Truax Field responsible for treatment of sewage at the Post, it should be stated that on no occasion could the effluent from the plant be considered as raw or untreated sewage. Furthermore, permission to collect samples on the Post was not refused as permission to do so was not requested.

PLANKTON STUDIES

The plankton studies accompanying this report must at the outset be clearly recognized as fragmentary and not comparable in thoroughness to the chemical studies. It was hoped that from these studies however, certain trends of plankton growth might be recognized.

All samples were of 400 ml. volume, and were preserved by the addition of 5% formalin, then sedimented in the dark, and the sediment analyzed. In a very few cases Anabaena spiroides and Microcystis aeruginosa were at that stage in their life history where their gas content in pseudovacuoles was such that they floated instead of sinking; in these cases direct counts were made. All organisms were either identified or, in the case of a few, given provisional names. This method gives a very poor estimate of the numbers of small Crustacea.

Taxonomic studies on the algae of the Wisconsin lakes have been so thorough that no additional species were encountered. Studies of the flagellated algae and protozoa have not been so extensive however, and many of these are here reported for the first time. Qualitative and quantitative importance of the plankton algae may be gauged by the method used, but not volumetric importance, and thus far this last phase, attainable by estimating the average volume of an individual of each species, has not been done. Nevertheless, since a very considerable number of flagellated algae and protozoa particularly the Cryptomonadida and the Mastigophora, were present during much of the time, they are of sufficient importance to be taken into account.

Plankton samples for the first year's work are also surface samples, taken within the top meter of water. Those taken at the outlets of lakes represent what might be termed mixed water. It is known that the greatest plankton concentrations normally occur near the surface, and the few sets of vertical samplings have borne out this fact upon being examined. In this respect therefore, the plankton samples are representative.

Lake Mendota was not intensively sampled, but Monona, Waubesa and Kegonsa were sampled at the four compass points. Separate samples were also taken in Monona Bay. Wingra, because of its small size was sampled at one point. The several samples from Monona, Waubesa and Kegonsa showed that qualitatively the plankton was much alike over the entire lake; Monona Bay however differed from the rest of the lake. These lakes showed a plankton roughly reminiscent of clean streams, but the plankton of Monona Bay might be interpreted as indicative of recent and rather heavy organic pollution.

Quantitatively, the distribution of the plankton in these last mentioned three lakes, was unequally distributed. As simple a factor as a prevailing wind could readily account for this however.

One outstanding fact was revealed by these studies. Quantitatively, these three lakes were richer by far than Mendota and twelve lakes in Southeastern Wisconsin, in regard to amount of plankton. This is a fact: it may not be taken

Table No. III

Total occurrence of Algae and Protozoa in the Madison Lakes, December 1942 to July 1943, showing number of samples taken, number of species*, and frequency of occurrence of various groups. Frequency of occurrence expressed in percentage, is manifestly independent of blooming.

LAKE	MENDOTA			MONONA			WAUBESA			KEGONSA			WINGRA		
No. Samples from that lake	9			30			45			25			10		
Total No. species; 193*	No. Species	No.Occurrences	% Occurrence	No. Species	No.Occurrences	% Occurrence	No. Species	No.Occurrences	% Occurrence	No. Species	No.Occurrences	% Occurrence	No. Species	No.Occurrences	% Occurrence
Blue green algae - Myxophyceae	6	11	20	12	33	10	11	39	8	9	18	8	13	42	32
Diatoms-Bacillarieae	15	38	28	19	84	15	27	208	17	16	120	30	21	66	30
Dinoflagellates-Dinophyceae	0	0	0	1	14	50	3	23	17	2	25	50	3	7	23
Olive green flagellates-Cryptophyceae	4	26	72	4	65	50	4	102	57	5	60	49	5	28	56
Yellow brown flagellates-Chrysophyceae	6	9	18	8	30	12	10	39	9	8	25	15	10	23	23
Green flagellates-Euglenophyceae	3	3	11	8	25	10	15	49	7	8	15	7	8	12	15
Green flagellates - Volvocales	6	15	27	11	55	16	16	77	10	12	44	15	6	16	27
Non-Motile green algae Chlorophyceae	16	33	23	35	97	9	46	262	12	26	89	14	41	108	24
Colorless flagellate Protozoa-Mastigophora	5	9	20	7	30	14	6	37	14	14	43	12	6	17	28
Amoeboid Protozoa-Sarcodina	1	1	11	2	2	3	7	12	4	3	3	4	1	1	10
Ciliate Protozoa-Infusoria	8	23	32	13	55	14	14	78	12	18	101	26	18	39	23

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* In some cases, e.g. Scenedesmus, a single record of the genus is made, where a number of species are actually represented.

as a generalization, nor can too much be deduced from it. Furthermore, until additional data is compiled, it may be stated as a fact only for the several times at which plankton samples were taken.

Table III gives the quantity and quality of plankton, in numbers or units per ml. of raw water, present in any sampling. It is apparent that there are pronounced differences in the species present in various lakes, and in the extent to which some common species are present in two or more lakes. These observations are not subject to interpretation however, and it seems dangerous to comment on more than the one outstanding fact pointed out above. The chief point of interest in this table is that it shows a consistently higher plankton population for Monona, Waubesa and Kegonsa.

There is little to be gained in calling attention to blooms - both lakes and rivers have them, and it depends upon the nature of the organism or organisms causing the bloom as to whether and to whom they are obnoxious. Diatom blooms in the Madison Lakes (which come in spring or early summer, as for example the Cyclotella bloom in Monona and Kegonsa about April 21) are not usually obnoxious, but to the superintendent of a water filtration plant they are very troublesome.

Blooms of blue green algae are the principal trouble causers in these lakes. Usually such blooms occur in August or early September, but here they may occur earlier. On June 14 Kegonsa was experiencing a mild bloom of Microcystis aeruginosa, but the Crawfish River was blooming with Aphanizomenon flos aquae, and had almost as many colonies of

Microcystis. At the same time Koshkonong had a heavy bloom of Anabaena (circinalis) and Aphanizomenon while Geneva had a lesser bloom of Phormidium. These blooms were of less extent than those expected in the later summer, but they illustrate the point that such blooms must be expected and are not peculiar to the Madison lakes.

Both the Crawfish and Rock rivers seem to have a heavier plankton crop than the lakes unless the rivers fail to bloom excessively for brief periods, as the lakes do. This might be expected, except that below lakes there is a tendency for plankton to diminish in streams, as pointed out by Chandler (1) and Reif (2); if a stream supports a good growth of macroscopic vegetation, Liebmann (3) points out that it acts to strain out plankton organisms.

The Madison lakes are of the eutrophic or highly productive types. Figures on production in Mendota are few; it has shown a varied but lesser quantity of plankton at the times when sampled, than the others. Wingra has shown a highly varied plankton, with greater abundance of many species, than excessive numbers of a few. For the most part this has been true of Monona, Waubesa and Kegonsa; and figures are not yet available on one of the bad blooms for these three lakes. It should be pointed out that there is almost a constant crop in these lakes also. In the early winter, the crop this past year consisted of enormous numbers of the flagellates, Cryptomonas, Rhodomonas and certain Dinoflagellata in Monona, with much smaller numbers of these in Waubesa, Kegonsa and Wingra. February and March showed little plankton in the samples of surface water under the ice in any of the lakes - if plankton was present in abundance it was in the deeper waters. In April vigorous growth began, and since then there have been vigorous blooms of one species or another.

Why should these lakes show larger plankton populations than other lakes? Why should they bloom more than other lakes? And do the same factors that produce a bloom of one species, likewise produce a bloom of another? High temperatures are certainly one factor, and a factor about which nothing can be done now. There is also some evidence to show that lowered oxygen values of the hot summer days have a tendency to produce blooms of the colonial types of algae of interest to this survey. Thus Chambers (4) cited the prevalence of the filamentous diatom Melosira in warm water situations during the summer. Melosira has been the chief constituent of the plankton in the rather shallow, warm water of the Dallas, Texas, reservoir lake. It has also been much more abundant thus far in Lake Wingra than the other Madison lakes, and Wingra maintains the highest temperature of the five lakes.

It is felt that the answers to the preceding questions are suggested in part, by this investigation as a whole, but a brief consideration of some of the biological data shows it it to be correlated with the chemical data. With respect to the five Madison lakes, it is felt that the data for Mendota is extremely sketchy, but the data for the remaining four is better.

Blue-green algae were more abundant in kind than usually common to rivers. In Mendota the samples showed very few, only six species having been found, and no suggestion of a bloom. Despite this, it is known that there was a bloom during the early summer, and this illustrates how widely spaced sampling may entirely miss such occurrences. In Monona there were found in January a few strands of Oscillatoria, and a few blue greens generally until the last week in June. Waubesa showed much the same trend, but in June there was a bloom of Anabaena spiroides, 600 units per ml. of raw water. These units were counted as strands about 80 microns in length, this being the average length of half of one of the characteristic loops of this species. Kegonsa showed few species and little abundance until the last week in June when there was a bloom of Microcystis aeruginosa. Wingra contained a variety of blue greens, some fourteen species in all, and some abundance beginning in May. June 10 it bloomed with Anabaena spiroides, 736 units per ml. of raw water.

These early summer blooms are significant for these lakes, indicating the possibility of more frequent blooming than is generally the case, when blooming is confined to the later summer. None of these were nearly as heavy as sometimes occurs, and the inference is that later blooms would be more severe.

There were also extensive diatom blooms: Mendota showed very few diatoms at any time, but Monona had blooms in April of Asterionella formosa, 328 per ml. (cells, not colonies), 32,000 Cyclotella meneghiniana per ml., and a mild bloom of Fragilaria crotonensis, with Fragilaria virescens. But in May and June its diatom flora dropped very sharply. The Cyclotella bloom extended to Waubesa (248,000 per ml., April 22) and Kegonsa (48,000 per ml., same date), and there was a fairly large number of other diatoms in early spring, gradually diminishing by the end of June. Diatoma vulgare and D. elongatum attained considerable numbers in Kegonsa in June. Wingra contained rather large numbers of diatoms at all times. Tressler and Domogalla (5) regard diatoms as the most abundant plankton forms in this lake, and they are certainly important. This spring Stephanodiscus astraea was characteristic of this lake (168 per ml. May 27) while practically lacking in the other lakes. The large size of these cells, about 60 microns in diameter and 20 long, makes it of considerable importance.

Dinoflagellates were of minor importance. None were noted in the Mendota samples, and few elsewhere, except 1688 small peridinians in Monona Bay, December 29. Wingra had 112 per ml. April 6, and there were a few in Waubesa and Kegonsa in April. A large species, probably Tonyaulax, and Gymnodinium helveticum might easily have been important on account of their size, but numbers were very small.

Euglenophyceae were negligible. Unless large numbers occur later in the summer, this constitutes a striking difference between plankton of these lakes and river plankton. There have been found large numbers of several genera and species of Euglenophyceae in both the Crawfish and Rock rivers; this group is also quite characteristic of ponds. Therefore to find so few in the lake plankton has been a surprise.

The Cryptophyceae were well represented. In Mendota, numbers were somewhat small but they were consistently present until the end of June. Such fresh samples as were examined showed the blue flagellate, Chroomonas, but preserved samples showed only Cryptomonas erosa, Cryptomonas ovata and Rhodomonas lacustris. In Monona, in December the numbers of these were respectively 968, 84 and 16800 per ml.; in January 436, 118 and 14400 per ml. Then they practically disappeared in February and March but were again present in quantity in April, May and early June. In Waubesa and Kegonsa they followed the same course, except numbers were much smaller. Maxima for these two lakes were 136 C. erosa, 268 C. ovata in Kegonsa June 10, and 1376 R. lacustris in Waubesa June 25. Wingra never had large numbers of these, its maxima occurring April 6.

Chrysophyceae were uniformly few in number, except in Wingra, and species, although Dinobryon sometimes attained considerable abundance. Only six species were found in Mendota, but samples other than the effluent might have shown greater quantities and more species. On April 22 Monona Bay had 144 Chrysococcus major per ml., but other species of Chrysococcus were few. This is in striking contrast to rivers where this genus is often very abundant. The greatest members of Chrysophyceae in Monona, Waubesa and Kegonsa occurred in April but in Wingra they were present in some members in March, April and June, Dinobryon comprising the bulk of the group.

Volvocales were irregular in distribution. Mendota yielded very few, but on April 22 there were 10 colonies of Pandorina per ml. This organism was fairly constant in occurrence for all lakes except Wingra. In Monona Chlamydomonas was abundant in December, there being over 2000 per ml. in the bay. It was also abundant in April, while Diplostauron pentagonum was high, 144 per ml. in Monona Bay. Waubesa had a heavy bloom of Chlamydomonas April 16, but they were abundant in this lake in December and January. In Kegonsa they were the only organism abundant in March under the ice. In both lakes they were low in May and June. Kegonsa contained 24 Eudorina April 6. Wingra never showed many of the Volvocales.

Other green algae than Volvocales showed a pronounced seasonal effect. There were few of them in any of the lakes until June (referring only to planktonic forms) but with the advent of warmer weather they increased rapidly in numbers and some small blooms occurred.

The three free living groups of protozoa were all represented, but the rhizopods were of chance occurrence. Only a few plankton flagellates occurred, but in Mendota there were 860 Bicoeca lacustris per ml. June 18. This curious little flagellate was attached to diatoms and green algae. In Waubesa Dinomonas vorax was abundant in December and January. Colorless unidentifyable forms (some cannot be identified after formalin preservation) occurred frequently in Waubesa in January and February, and in Kegonsa in June. Desmarella moniliformis (576 per ml.) was a bloom in Kegonsa

April 21. Bicoeca lacuctris was a common epizoite in Wingra in May and June.

Ciliates were a varied group but the commonest plankton forms were five common to streams: Codonella cratera, Tintinnidium fluviatile, Strobilidium humile, Urotricha farcta and Strombidium sp. with Halteria grandinella occurring as an (at times) abundant lake plankter. Strobilidium was frequent in Mendota in June. In Monona, April produced large numbers of Strobilidium, Strombidium and Urotricha, with Halteria abundant in June. There was always a varied ciliate population in these lakes especially in Wingra, where total numbers were highest. But the only bloom of ciliates was in Kegonsa on March 23 when there were present 264 Urotricha per ml.

The data for the remaining twelve lakes will be discussed at the end of another year. But enough has been said concerning the Madison lakes to show that Waubesa and Kegonsa have the most abundant flora, and a large fauna as well. It has been shown too, that there are many kinds of organisms producing blooms, and that they are not restricted to the summer months. The quantitative relationship of different blooms to each other has not been discussed, but one aspect of this is probably a neutralizing effect, a bloom of one organism neutralizing or preventing another. For example Chlamydomonas and Pandorina apparently bloomed much more heavily in Monona than elsewhere, and this was true also of the Cryptophyceae in Monona. Just as we do not know the specific causes of blooming for an individual species, so are we ignorant of the effects of such blooms except in a general way. It has been shown by Henrici (6) that bacteria follow plankton pulses closely, and the present study has shown a depletion of certain chemical elements as the result of blooming. These are only links in a chain of sequences, and other biological effects are not evaluated. We do not even know why blooms terminate, as they do, often abruptly. The writer knows of one case in which a bloom of Pandorina and another of Chlamydomonas were apparently terminated by heavy parasitic infestation with chytrid fungi, and Pennington (7) states that the control of a small green algae, Diogenes, is due to their being eaten by rotifers. These latter then die due to oxygen depletion, because of the failure of photosynthesis. Depletion of food (bacteria, plants, animals, mineral elements) seems to be the most logical cause of termination of many pulses of organisms. But all of the above relationships show that the interactions of rapid increases of organisms in an environment are complex, and it is perfectly possible that there will be blooms in one lake, Monona for example, not taken into account because they are not obnoxious, which will exert an influence on the tendency of other organisms, possibly obnoxious ones, to bloom in that or connected lower lakes.

All of these five lakes except Mendota seem to have large plankton populations most of the time. It is merely that most of this plankton is not troublesome which keeps it from the public gaze, so to speak. Actually the continuous high population tends toward a rapid cycle of mineralization.

The use of copper sulphate to keep down blooms is difficult to evaluate but it probably tends to even out biological activity to some extent. The period when the lakes are plankton poor, as they were under the ice in January, February and March, allows the accumulation of large food reserves, and is probably an important factor in the earlier blooming of these lakes.

It might be misleading to refer to plankton effects so freely, and to neglect the importance of attached forms, or filamentous forms such as Spirogyra which might not be taken with a plankton sampler. Spirogyra (along with other filamentous forms as Mougeotia, Oedogonium and Zygnema) constituted a very pronounced bloom this spring, and might have been very troublesome if bathing had been possible. Cladophora forms dense bottom growths, and both it and the higher plants (weeds) support enormous growths of attached diatoms, blue green algae and other organisms, whose importance has not even been guessed at, and which must eventually be taken into account in the lake ecology.

The plankton does not indicate much immediate organic pollution. Generally it is of the type found downstream from a well purified sewage effluent. But it does indicate fertilization, and the final step towards utilization of mans refuse except one - decay of its own bodies.

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DISCUSSION

by

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This discussion will be limited to the following factors as related to the biological productivity of lakes, of which algal "blooms" are a major part:

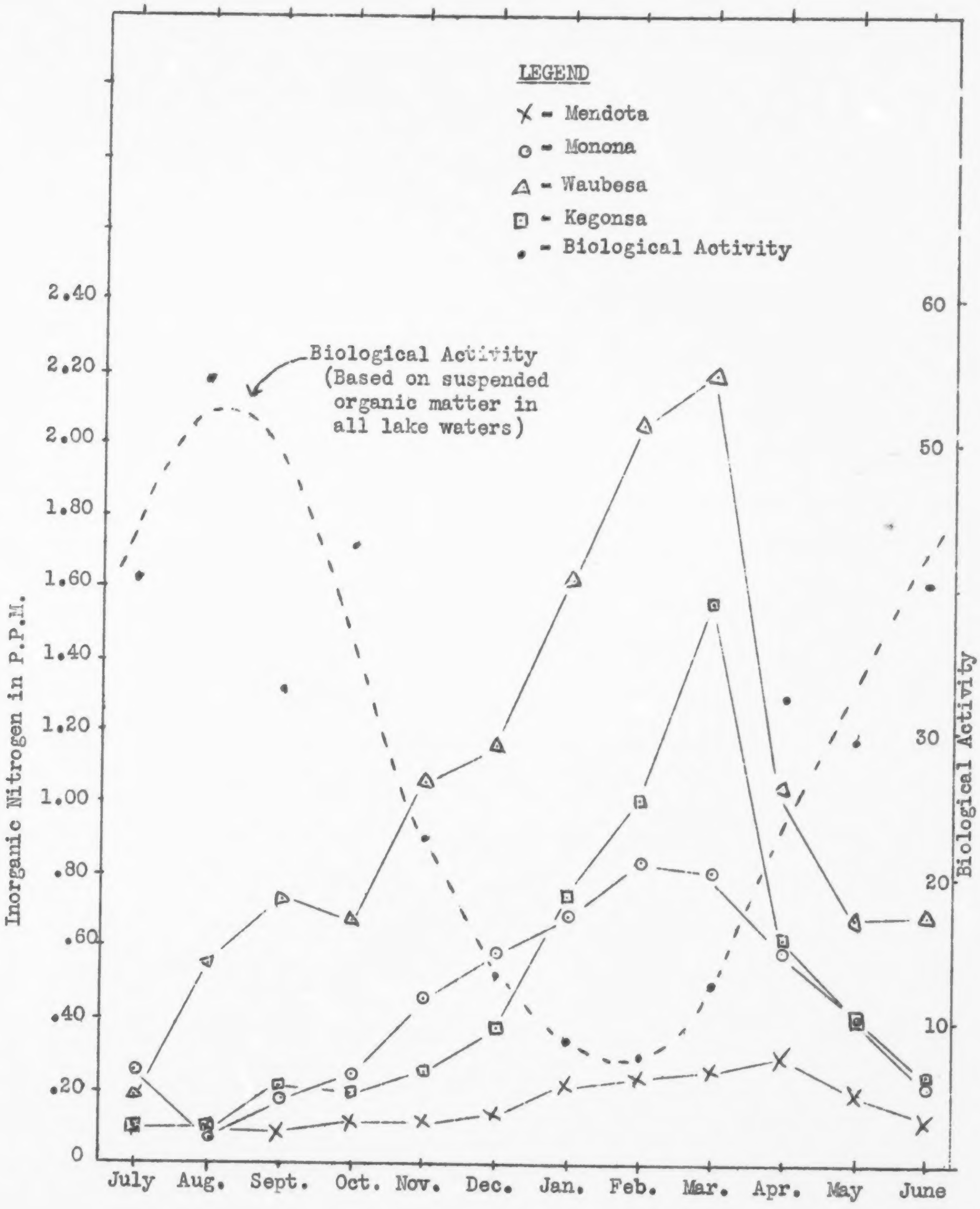
1. Limiting factors
2. Frequency and intensity of algal "blooming"
3. The development of drainage districts
4. The relationships between drainage areas, lake areas and lake volumes
5. Copper sulfate treatment of lakes
6. The future

Limiting Factors

The solution or control of many biological problems has been accomplished by ascertaining limiting factors which were capable of control. One of the favorite ones is to restrict a part or all of the food supply. In the case of algal "blooms", certainly the important factors of sunlight, temperature, hardness or alkalinity of the water, and water depth are beyond human control. It has been noted by many observers that the fertilizing mineral content of lake waters undergoes marked changes during the course of a year, reaching a maximum concentration during the winter months when biological activity is least and a minimum concentration during the summer months when the activity is greatest. These observations were confirmed during the recent survey and the results obtained for inorganic nitrogen, which showed the most marked changes, are given in Fig. 13. The data show that the maximum concentration was reached in most cases

FIG. 13

RELATIONSHIP BETWEEN BIOLOGICAL ACTIVITY AND INORGANIC NITROGEN CONTENT OF EFFLUENT WATERS FROM THE MADISON LAKES.

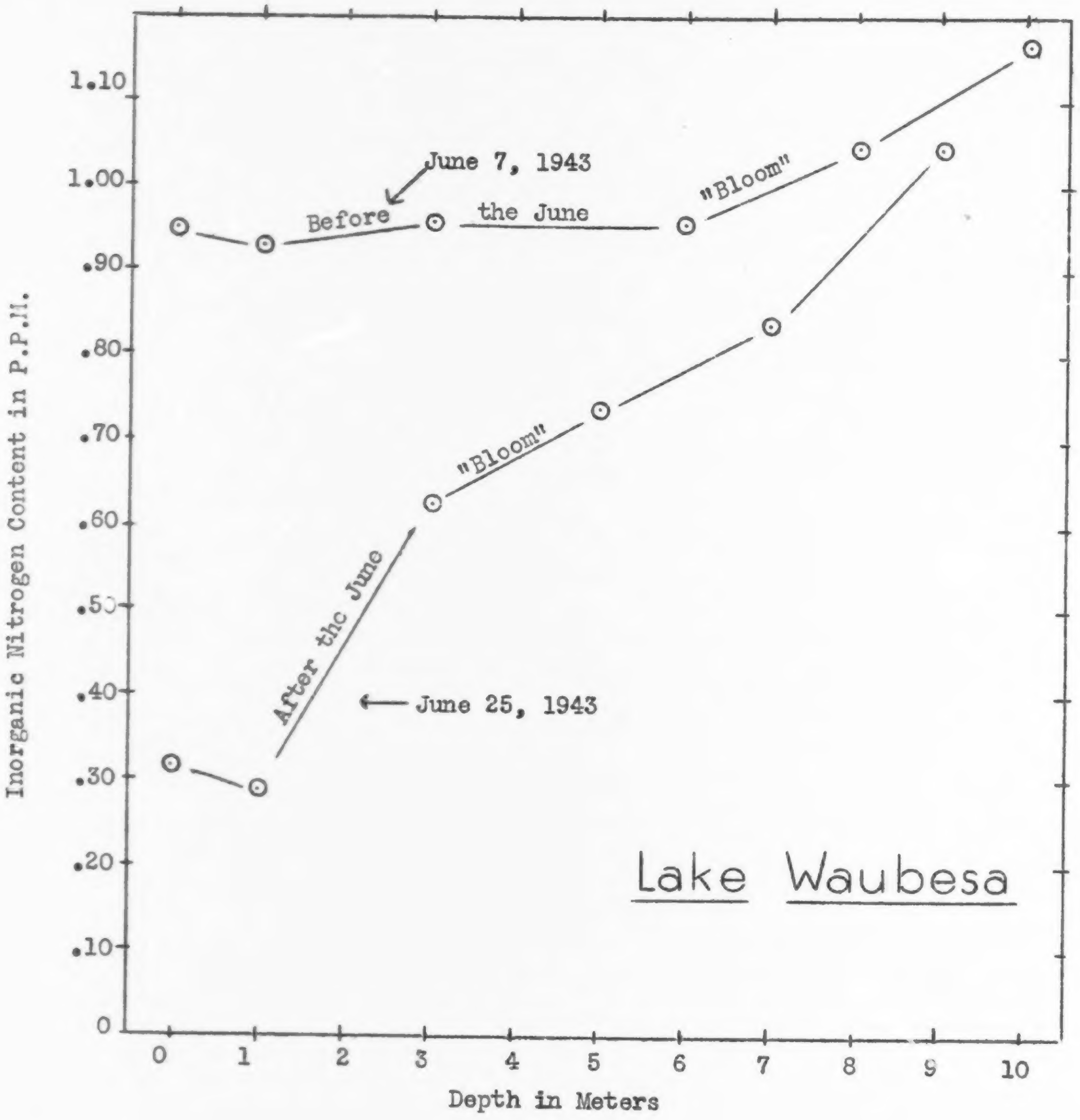


Biological Activity (Based on suspended organic matter in all lake waters) during the month of March and was in proportion to the loading per sq. mi. of lake area as given on page 21 of the report. The most significant information in Fig. 13, however, is that a minimum concentration of approximately 0.10 p.p.m. was reached in all of the lakes at some time during the summer months. It would appear therefore, that the content of inorganic nitrogen could be a limiting factor in controlling algal growths. Such a contention finds support in the fact that many forms of algae consist of approximately 50% protein, the nitrogen of which must be derived from the water as only a few forms are known to be able to fix nitrogen from the atmosphere.

Further proof of the importance of inorganic nitrogen in supporting algal "blooms" was obtained during June, 1943. During May and early June the development of algal "blooms" was restricted in all of the lakes because of the cool, cloudy weather then prevalent. This allowed rather uniform lateral and vertical distribution of fertilizing elements in the lake as a result of vigorous wave action. A series of depth samples were taken from Lake Waubesa on June 7th when very little algal growth was existent. Objects could be seen with ease in 10 ft. of water. The depth samples were subjected to chemical analysis and the results, Fig. 14, showed a fairly uniform content of inorganic nitrogen from surface to bottom. About the middle of June weather conditions, sunlight and temperature, became very favorable for the development of a "bloom". On June 25th, after the bloom was well developed, a series of depth samples were again taken

FIG. 14

RELATION OF ALGAL "BLOOMING" TO REDUCTION OF INORGANIC NITROGEN CONTENT



and analyzed. These results, Fig. 14, showed a much lower concentration in the waters near the surface while the concentration in the deeper waters was nearly as high as it had been before the bloom occurred. These results demonstrated that a marked reduction of inorganic nitrogen occurred simultaneously with the development of the "bloom".

The question is often raised: Why do the lakes continue to "bloom" even after the food material has been stripped from the surface waters where most of the "bloom" occurs? One answer becomes obvious with a little study of Fig. 14. A great reservoir of inorganic nitrogen exists in the deeper waters, and, after some violent wave action and possibly, to some extent, diffusion, the contents of the deeper portions are carried to the surface waters, i.e. the top one or two meters, where it becomes available for further "blooming" when other natural conditions of light, temperature, etc. are suitable.

There is some indication that soluble phosphorus may become a limiting factor in Lake Monona on occasion as its concentration during some periods of the summer drops below 0.01 p.p.m. Such is not the case in lakes Waubesa and Kegonsa which have abundant supplies at all seasons. The concentration is usually above 0.20 p.p.m. and has been above 0.50 p.p.m. on numerous occasions. The high concentration in the two lower lakes is a result of the large quantities of phosphorus contributed to Lake Waubesa by the effluent of the Madison sewage plant.

Frequency and Intensity of Algal "Blooming"

The frequency of "blooming" is related in some degree to temperature and intensity of sunlight, but under optimum conditions it is dependent upon the speed at which a suitable concentration of food material is re-established in the upper layers of water. The latter is a function of the concentration in reserve in the depths of the lake and the rate of contributions to the lake. Both of these factors are important in Lake Waubesa as the contribution from the sewage plant is continuous and approximately equal in amount day after day. Only the former is of importance in Lake Kegonsa as the contribution from the tributaries to the lake is at a minimum during the growing season.

The intensity of a "bloom" is dependent upon the concentration of food material that is built up in the surface waters prior to the onset of favorable conditions for "blooming" and also the quantity that is actually converted before unfavorable conditions set in. Thus, the possibility of a serious "bloom" developing is much greater when several warm quiet days follow a prolonged windy and cloudy period than when one or two days of fair weather follow one or two days of stormy weather.

The Development of Drainage Districts as a Factor in Increasing the Contribution of Fertilizing Elements to the Local Lakes

There is no question but that the draining and development of marsh areas for farming purposes during the past forty years has increased markedly the contribution of inorgancc nitrogen from agricultural sources. This is to be expected, because the soil of such areas has an unusually high organic nitrogen content due to the humus it contains. Bacterial decomposition of the organic matter continues unabated and the organic nitrogen is freed as inorganic nitrogen, which when reaching the nitrate stage of oxidation is washed through the soil because there is no special mechanism present to retain it.

Door Creek, which drains into Lake Kegonsa, is a notable example of a stream draining a well developed marsh area. Although the normal flow of Door Creek is about the same as that of Nine Springs Creek, storm flows on Door Creek are much greater and the annual contribution of inorganic nitrogen is about 2½ times as great. On occasion, the concentration of inorganic nitrogen in Door Creek equaled the concentration in the effluent from the Madison sewage plant, 15 p.p.m. The contribution of soluble phosphorus and potassium from such areas did not appear to be above normal.

The suggestion has been made, and it appears to be a feasible one, that the drainage ditch for Door Creek into Lake Kegonsa be closed and a new one dug to the river below the lake. This, no doubt, would relieve Lake Kegonsa of a considerable load of fertilizing minerals, suspended organic matter, and plain silt.

Further development of marsh lands in lake areas such as the local one should be studied with a view towards anticipating and preventing additional pollution and fertilization of lakes.

The Relationships between Drainage Areas, Lake Areas, and Lake Volumes

Since much emphasis has been placed on numerous occasions on the importance of agricultural drainage in relation to the local lake problems, the following ratios may serve to clarify our thinking along these lines:

Lake	Ratio of Direct Drainage Area to Lake Area	Ratio of Direct Drainage Area to Lake Volume in B.G.
Mendota	17.4	2.1
Wingra	12.0	6.1
Monona	5.9	1.0
Waubesa	14.1	4.2
Kegonsa	14.5	4.5

These values show that each sq. mi. of Lake Mendota receives the drainage from 17.4 sq. mi. of land area. All the other lakes have a lower loading, with Lake Monona having the least. On the basis of drainage area to lake volume, lakes Waubesa and Kegonsa carry the greatest loadings. The loading on Monona is only half of that on Mendota. It is, therefore, very difficult to argue that agricultural drainage is an important consideration in the problems of Lake Monona. With the natural loadings on Lake Waubesa and Kegonsa from one to two times the loading on Lake Mendota, it is not difficult to see why these two lakes with their present additional unnatural load are such active biological factories.

Copper Sulfate Treatment of Lakes for the Control of Algae

Treatment of lakes with copper sulfate for the control of algal "blooms" is a practice which has been adopted from the field of water supply. The benefits which are derived are of short duration and this constitutes one of the serious shortcomings of this method of control.

The action of copper sulfate is to arrest the normal biological forces in a body of water that are active in converting inorganic matter into organic forms. These forces are constantly at work trying to hold on the land those things the water is destined to carry to the sea, if nothing interferes. This is a fundamental factor in the conservation of natural resources. The marsh lands of today are a result of such action in years past.

There are in nature many displacements of natural phenomena which can be attributed to the invasion of civilized man. The local lake problem is one of them. Its adjustment and control by artificial means such as copper sulfate treatment will, of course, be necessary until such time as man finds suitable ways of removing the causes or reducing them to the point of insignificance.

The Future

Any solution of the local problem must take into consideration developments in the near and perhaps distant future. The City of Madison and its suburbs has increased in population by 9,340 persons during the past three years. The day is not far distant when this center of government and education will reach a population of 100,000, then it will be 150,000, etc. It is reasonable to assume that industrial growth will increase similarly. Thus, it would be logical to conclude that in the course of another 50 or 100 years the contribution of pollution and fertilization by the Metropolitan Area will be doubled. During a similar period, it is doubtful whether the contribution from natural sources will increase materially. In the year 2000 A.D., the contribution of inorganic nitrogen from the city may approximate 85% of the total contribution to Lake Waubesa, and the soluble phosphorus 94%, unless marked changes are made in current practices.

Conclusions

1. The biological productivity of the local lakes is a function of the loading of inorganic nitrogen on each lake.
2. The soluble phosphorus content of a water may be an important factor in limiting the rate of biological activity and in determining the nature of the growths when its concentration drops below 0.01 p.p.m.
3. Drainage from improved marsh lands is approximately two to three times as rich in inorganic nitrogen as drainage from ordinary farm lands.
4. On the basis of agricultural drainage, Lake Mendota should be from 2 to 3 times as productive of biological life as Lake Monona, and Waubesa and Kegonsa should be from one to two times as productive as Mendota. Lake Wingra, on the basis of lake volume, should be the most productive of all.

5. High biological productivity and nuisance conditions do not always occur simultaneously; for example, Lake Wingra, a very shallow lake, does not develop offensive conditions in spite of its high productivity. The reason for this has not been ascertained, but may be related to its low phosphorus content.

DISCUSSION

by

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The chemical data accumulated during this survey, and considered in this report is the first critical analysis of the troubles in the Madison lakes, backed by concrete evidence as to the causes of those troubles. There can be no dispute as to the fact of heavy fertilization of the lakes by the materials poured in. The use of sewage for fertilizing lakes in Germany is too well known; the use of sewage sludge as a fertilizer is widespread in this country. These two facts constitute proof of the fertilizing value of sewage, the first as to raw sewage, and the second as to the solids and mineralized portions of treated sewage. Snell (1) gives calculated monetary values of human excreta as fertilizer and points out that "85 per cent of the fertilizer value of excreta is contained in the urine and is therefore lost in the effluent of ordinary sewage treatment plants". In other words, it passes on through the plant and out with the effluent, not being incorporated into the sludge. This fact should at once render untenable any argument that bypassed sewage solids, if found, are a major cause of blooming in the lakes.

On the other hand, the addition of organic fertilizer to fish ponds, is practised in many places and Juday (2) has shown that soy bean meal and cottonseed meal sharply increased the plankton content of Weber Lake in northern Wisconsin. It seems highly significant that his use of mineral fertilizers (superphosphate, lime, nitrogen compounds and potash) did not increase plankton in four years (1932-35 inclusive) but this emphasizes the possible fertilizing effect of sewage plant effluents, which contain organic matter in addition to mineral matter. Complete fertilizers of the 5-3-5 or 6-3-6 N - P - K types have been used by Loosanoff and Engle (3) to provide blooms of green plankton for feeding oysters, but these workers found such fertilizers as cottonseed meal highly effective.

It has been repeatedly shown Lackey (4), Brinley (5) that streams receiving either sewage or effluents from efficient sewage treatment plants develop huge plankton populations at varying distances below the entrance of such materials. The same statement should apply to lakes, but aside from the present study, there are few references in the literature to substantiate it, other than those mentioned, and some rather generalized observations. There is one point which should be brought out in these stream studies however: the numbers of blue green algae in the plankton blooms are small, and the writer knows of no instance or reference when blooms of Microcystis or Anabaena were produced in sewage or sewage effluent fertilized streams. Furthermore, the plankton of such streams in the Mississippi watershed exhibits the same general qualitative and quantitative makeup, indicating that in streams generally, sewage or its products tend to produce much the same types and quantities of micro-organisms, and that those organisms are not predominantly blue green algae.

Such general evidence as has been adduced favors the opposite view. The writer has noted blooms of Microcystis and Anabaena (confining the discussion to the two apparently most obnoxious blue greens of the Madison lakes) on many lakes and ponds over a period of years. Some of these received no sewage, some small amounts, some received varying amounts of pasture drainage, while a few ponds had very small water sheds with human, agricultural or pasture land drainage. One was a pond in a city park. Berry (6) considered Cladophora (a green alga common to the Madison lakes) and Anabaena as being bad actors in reservoirs, where their accumulation in heavy masses in shallow areas, decomposition, and bad odors were generally associated "in the mind of the layman with inadequate sewage disposal." He considered that sewage favored Cladophora, a common observation, but noted no such fact for Anabaena.

The truth is that we are still far from more than general knowledge as to the causes of blooming of specific algae. The complexity of the problem is well illustrated by diverse findings. Allgeier, Peterson and Juday (7) consider plankton blooms natural to eutrophic lakes, which includes the Madison lakes. It has been recognized that spring and winter blooms are usually diatoms;early summer, flagellates; midsummer to late summer, green algae; and that blue green algae bloom in late summer. These workers considered that blooms might be affected by available carbon, and that this was more available to bacteria (and therefore indirectly to plankton) from decay of weeds, etc., than carbon of the lake deposits.

Wimmer (8) found a general correlation between amounts of organic nitrogen and plankton, but none between plankton and phosphorus   Gessner(9) found very few plankton organisms in lakes in South Sweden containing from 110 to 540 p.p.m. of nitrate nitrogen, and 8.5 to 52 p.p.m. of phosphorus. Such findings are supported by the work of Gauseva (11) and Chu (10). The former found maximum blooming to coincide with maximum Fe, but Oscillatoria required a minimum of 0.2 p.p.m. N rather than P. or Fe, while Anabaena required more Fe than Aphanizomenon. High Mn tended to exert a toxic effect on algae. Chu studied fourteen algae in pure culture more than two years, and found they used both ammonia and nitrates, but the former was more used! He found that all flourished with from 1.0 to 7.0 p.p.m. of N, and 0.1 to0.2 p.p.m.P. but that more than 20.0 p.p.m. of either element had an inhibiting effect!

Such considerations sharply accentuate the fact that we do not know the cause of blooms of specific organisms, and demand that we refrain from considering sewage contributed nitrogen and phosphorus as the sole causative factors. But they also lend strong credence to the idea that the contributions of these two materials as well as the materials contributed along with them, do cause heavy plankton production, probably including the production of Anabaena and Microcystis. Therefore removal of these two elements, and any others which could be removed along with them, seems certain to decrease plankton production generally, and probably production of Anabaena and Microcystis.

It would be well to remember that any removal of nitrogen and phosphorus from influent waters to these lakes might not have an immediate remedial effect of great magnitude. The layman might be inclined to take such a view and be sharply critical if obnoxious blooms did not stop at once following removal or further treatment of the effluent. There are however, at least three reasons why the lakes might continue to bloom for a considerable period.

First, there may be other chemical factors closely related to blooming in addition to the nitrogen and phosphorus contributed by sources enumerated herein. This is at once revealed by the known mechanism of the non-biological removal of phosphorus as tricalcium phosphate, and by the scant knowledge of lake bacteria relative to the nitrogen cycle. Another one of these unknown factors is the uncertain status of fixation of free nitrogen by blue green algae. If future investigation substantiates claims of such utilization of dissolved nitrogen and extends the list of organisms known to have such a source available to them, nitrogen removal from the treatment plant effluent becomes useless.

These considerations do not obviate the fact that present contributions of nitrogen and phosphorus are readily available forms and extensively used: probably a "first choice" relationship exists. But should these sources be removed, other possible sources should be remembered.

Secondly, the bottom deposits which have been building up over a long period of time should be considered. One component part of these results from sedimentation of dead plankton bodies; another results from the annual death and decay of rooted lake vegetation and attached algae (which at times form very heavy growths both on the rooted plants and on the bottom); and a third consists of sludge from sewage treatment plants and sewers. There are other sources also, but these contributed largely to the organic matter. The depth of such deposits in the five Madison lakes needs more investigation but in places at least, according to Birge, Juday and March (12) depths of five meters have been encountered. This rich organic stratum is continually producing nitrates, ammonia and carbon dioxide; furthermore any of the gas bubbles, including methane and nitrogen, rising from it afford excellent absorption of such gases before the surface is reached, as well as carrying up some bottom materials. One has but to observe the black sludge brought up by gas bubbles at the Johnson Street sewer to realize this last factor is an important one. Any mud or sludge deposits therefore constitute reservoirs of nutrient material, from which the overlying water is being continually enriched. Decomposition is mostly anaerobic since oxygen can reach only a thin surface film of the deposit, and of course no oxidation proceeds when the lake waters are anaerobic. This deposit once laid down, is not removed. Imhoff (13) considers a flow of one meter per second necessary to remove sludge banks in streams. Hence in lakes, such deposits, because of the slow rate of decomposition, provide a source of enrichment for long periods.

A third consideration has to do with the standing crop of weeds in the lakes. In protected places the surface may be completely covered with floating weeds such as Wolffia, Lemna and possibly Spirodela. These draw all their nourishment from the surface water, and are persistent throughout the summer. They certainly prevent blooms in the coves they inhabit but are rather useless, and obnoxious to bathers. The rooted plants have been well studied for Mendota by Rickett (14) and Schuette and Hoffman, et. al (15). The standing crop of these is large, and they provide vast amounts of plankton food as they die and decay. Their chief importance to the problem under consideration lies in the fact that they draw upon the plant foods in the bottom deposits and therefore make these available to plankton at a much faster rate, than mere diffusion from the bottom deposits. Also, they carry on a yearly cycle, growing, decaying, and adding something to the mud from which they emerged. That they tend to cause heavy plankton production is well shown by some of the other southeastern Wisconsin lakes. Thus Pewaukee, with a heavy weed growth, has given enough trouble to be treated. while the only part of Lake Geneva which has been troubled with algae, is Williams Bay, also the seat of heavy weed growths.

In the whole, certain considerations seem warranted from the experimental work and the general consideration of the problem.

1. Lakes have been known to bloom from time immemorial.
2. Blooms in the Madison lakes have been historically recorded beginning as far back as 1882.
3. The most obnoxious blooms appear to be those of blue green algae particularly Anabaena and Microcystis.

4. Plankton studies of the Madison lakes and twelve other southeastern Wisconsin lakes reveal that several have bloomed, but that Waubesa and Kegonsa have the heaviest plankton population, both quantitatively and qualitatively. They are closely followed by Monona and Wingra.
5. Wingra at times has the greatest variety of plankton, but it contains much zooplankton; its plankton is balanced.
6. The Crawfish and Rock rivers are excessively rich in plankton, both qualitatively and quantitatively. Many of the species found in them occur sparingly or not at all in the lakes.
7. Since the sampling stations on these two rivers are not below the sewage treatment plants of large cities it is a fair assumption that their excessive amounts of plankton result from agricultural drainage.
8. It is difficult to see how further enrichment of the Rock river could be made without nuisance.
9. The Madison lakes are hard water eutrophic lakes with heavy weed growths in them. As such, they would normally tend to be plankton rich.
10. There is little question that Monona, Waubesa and Kegonsa are being further enriched by the addition of storm sewer flows other than rain water, and by the effluent of the Madison Sewage Treatment plant.

11. The plant effluent is as good as the average effluent, so that sewage entering the plant is adequately treated; but the effluent is normally a good fertilizer, as proved by many other studies.

12. Reduction of the amount of phosphorus and nitrogen entering the lakes, should lead in time to a reduction of the amount of plankton produced therein.

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DISCUSSION OF STREAMFLOW E SUREMENT

by

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The streamflow data used in this report are based on 385 current meter measurements of discharge, the river discharge records of the U. S. Geological Survey gage on the Yahara River near McFarland, the U. S. Weather Bureau records at Madison and Stoughton, and certain alkalinity measurements.

It was considered necessary to take measurements at all the major streams contributing water to lakes Monona, Waubesa, and Kegonsa. Gaging stations were selected at the locations shown on Fig. 1 and listed in Table No. IV Station sites were selected so that accurate records could be obtained at convenient points.

The results of the measurements and the stream discharges estimated from them are shown on the daily record sheets in the Appendix. Actual measured values of discharge are indicated on these figures by small circles.

All direct stream measurements were made using a calibrated Price Current Meter to measure the velocity of flow. The measured velocity times the cross-sectional area of the stream gave the "Discharge" in cubic feet per second which is commonly abbreviated to Second-feet or Sec.-ft.. Because discharge varies from day to day it was necessary to interpolate between the direct measurements in order to estimate the discharge for each day of the year for each

Table No. IV

Station	Drainage Area Sq. mi.	Name	Location of Measurements
MT-1	254	Yahara River Outlet of Mendota	C.M.St.P.&P. Ry. Bridge near Williamson St.
MT-2W	14.1	West Branch Starkweather Cr.	Commercial Ave. Br.
MT-2E	9.0	Starkweather Cr.	County Trunk T.
MT-3	6.0	Murphy's Creek	Fish Hatchery Road
MO-5	301	Yahara River Outlet of Monona	Interlake Bridge U.S. Highway 18
YT-1	13.3	Nine Springs Cr.	Bridge on Highway S.E. of Madison Sewage Plant
YT-2		Nine Springs Sewage Treatment Plant	Plant Records
WT-2	4.3	Clemen's Creek	Flume near Highway
WT-3	6.7	Swan Creek	Flume near Highway
WO-4 KT-1	350	Yahara River Outlet of Waubesa	U.S.G.S. gage at Dam
KT-2	27.0	Door Creek	Bridge on Highway M
KT-3	4.0	Williams' Creek	Flume near Highway
KT-4	3.4	Halverson's Cr.	Near U.S. Highway 51

gaging station. The method of interpolation varied somewhat with the character of the stream and will be considered for each similar group of conditions.

Discharge of the Yahara River at the outlet of Lake Waubesa is determined by the U. S. Geological Survey cooperating with the Wisconsin Public Service Commission. Discharge measurements made by our survey checked those made by the U. S. G. S. and in some cases were used to supplement the data they obtained. The discharge values for station KT-1 were considered to be the same as those published by the Geological Survey for their gage.

The flow at the outlet of Lake Mendota was computed on the basis of weir flow over a calibrated weir. The lock tender keeps a record of daily gage readings of the level of Lake Mendota. These gage readings were tied in with the level of the stop logs in the main dam in order to get the head on the logs when considered as a weir. These heads were compared with the discharges measured in the river below the dam and gave a very good calibration curve which was then used to compute daily flows. Appropriate corrections were made in all cases for flow over the side dam and flow through the lagoon.

The Yahara River at the outlet of Lake Monona is an exceedingly difficult place to measure discharge. The relatively low flow during the summer months, large lake areas at both ends of that stretch of the river, lake level regulation at both Mendota and Waubesa dams, wind effect on the lake levels, and large cross-sectional areas at all measuring sites combine to make it impossible to get accurate direct measurements along this section of the river. After several attempts at direct measurement proved that accuracy was impossible by that method, it was decided to compute the monthly average flow at Interlake Bridge as follows:

The average discharge at the outlet of Lake Monona (Station MO-5) for each month was considered to be the sum of the average discharges, for that month, of the stations at Mendota Outlet (MT-1); plus Starkweather Creeks (MT-2W and MT-2E); plus Murphy's Creek (MT-3); plus the discharge from the unmeasured area of 12.5 square miles, at the average rate from the measured area; plus the rainfall volume on the lake area divided by the seconds in a month; plus an estimated flow of 6 sec.-ft. from springs; plus the volume change due to change in lake level, divided by the seconds in a month; minus the evaporation as computed by the Meyer Formula. The computed evaporation varied from 0.32 inches per month in December to 6.30 inches per month in July and compared favorably with 7-year mean values of 0.62 inches in January to 6.14 inches in July which were measured by the U. S. Army Engineers at Milwaukee from 1861 to 1868 inclusive.

Continuing this same method to compute the discharge from Lake Waubesa, the value was computed to be the sum of the discharges at Monona Outlet (MO-5) (as computed above); plus Nine Springs Sewage Treatment Plant (YT-2); plus Nine Springs Creek (YT-1); plus Clemen's Creek (WT-2); plus Swan Creek (WT-3); plus corrections for discharge from the unmeasured area of 20.9 square miles, direct rainfall, springs (estimated at 5 sec.-ft.); changes in storage, and evaporation, all as outlined above. The resultant computed average discharge was compared with the U. S. G. S. recorded discharges for the same point and the necessary corrections distributed to the discharges from the unmeasured areas in proportion to those areas. The numerical corrections applied to the discharge at Monona Outlet (MO-5) averaged 5 sec.-ft. or 3 percent of the U. S. G. S. average discharge at Waubesa outlet. Six of the corrections were plus and six were minus.

The discharge from the Nine Springs Sewage Treatment Plant was obtained from the records of the Madison Metropolitan Sewerage Commission.

The flows from the tributary creeks were measured by current meter. Since the cross-sectional areas of the streams were so large that the dry-weather velocities were too small to be measured, it was necessary to constrict the openings through which the water passed. On the larger streams; that is, both Starkweather Creeks, Murphy's Creek, Nine Springs Creek, Door Creek and Halverson's Creek, constrictions consisted of barriers built out from each side of the stream leaving an opening several feet wide in the middle. Side walls parallel to the stream were built at the ends of each barrier making in effect a rectangular channel with side walls of wood and the natural river bed for the bottom. The entrance to the channel was constructed to permit smooth inflow of the water. Velocities were measured near the discharge end of the channel. Generally the barriers were installed at the downstream side of a bridge so that high flows going over the top of the barrier could be measured at the upstream side using the full cross-sectional area of the stream without any appreciable interference due to the barrier being in place.

Clemen's Creek, Swan Creek, and William's Creek had flows too small for this method of measurement. Rectangular wooden flumes 12 inches wide and deep and 5 feet long were installed in the creek bed and barriers built to the banks. A full size flume of this type was calibrated in the laboratory and it was found that when the current meter was set in the center of the stream of water flowing in the flume the actual mean velocity was 85 percent of the velocity recorded by the meter. This factor was reasonably independent of depth of flow and backwater effect and was used in all subsequent computations.

Interpolation of discharge on days when no measurements were taken was made taking into account the previous rainfall, temperature (during the winter season), and runoff characteristics of the areas. Since it was desirable to collect the water from as much of the small tributary drainage areas as possible, all the gaging stations were located close to the lakes where the backwater effect from the lakes made impossible the use of ordinary discharge rating curves. As a result a large number of direct discharge measurements were taken.

It was found also that the alkalinity of the water and the discharge, particularly during periods of storm runoff, could be related by an alkalinity rating curve. Daily water samples were then taken at the more important tributary streams and corresponding discharges computed. It is interesting to note that during the 24 hours of maximum runoff during the year (March 15 and 16), values of the computed average runoff rates in second-feet per square mile for the main tributary creeks were as follows: Door Creek, 17.3; Nine Springs Creek, 14.5; East Branch Starkweather Creek, 15.1; and West Branch Starkweather Creek (where airport construction has modified natural drainage), 11.1. The high degree of consistency of these rates coupled with 7 actual discharge measurements taken during this period which check the rates of flow computed by the alkalinity measurements give confidence in this method of estimating the flood flows.

The outlines of the drainage areas shown on Fig. 1 were obtained from the U. S. G. S. quadrangular maps for this area supplemented by data from the Hydrographic Map of Wisconsin prepared by the Wisconsin Public Service Commission. When the area tributary to the U. S. G. S. gage at the outlet of Lake Waubesa was measured and compared with that computed by the Commission, it was found that the two figures agreed within one square mile which is remarkably close for an area of 350 square miles.

In conclusion it should be stated that the discharge values are entirely consistent throughout for all the streams and that considering the difficulties involved, the accuracy is well within that required.

PART IV

APPENDIX

This appendix contains all the stream flow data and that part of the chemical data which was used to derive the charts presented in this report.

One complete copy of the report containing all data gathered during the course of the survey will be placed on file at the Library of the University of Wisconsin

MT-1 104< YAHARA RIVER AT OUTLET OF MENDOTA

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Inorg. N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	39.6	5.41	.09	19.2	154	589
	9-16	35.8	"	.09	17.4	139	
	17-24	44.3	"	.09	21.5	172	
	25-31	36.4	"	.09	17.7	124	
Aug. '42	1-8	34.4	"	.09	16.7	134	595
	9-16	31.3	"	.09	15.2	122	
	17-24	40.9	"	.10	22.1	177	
	25-31	43.0	"	.10	23.2	162	
Sept. '42	1-8	43.0	"	.07	16.3	130	567
	9-15	39.4	"	.08	17.1	119	
	16-23	36.4	"	.09	17.7	142	
	24-30	38.7	"	.12	25.1	176	
Oct. '42	1-8	36.9	"	.16	31.9	255	661
	9-16	36.9	"	.10	20.0	160	
	17-24	34.3	"	.09	16.7	134	
	25- 31	24,6	"	.12	16.0	112	
Nov. '42	1-8	57.8	"	.14	43.8	350	1,334
	9-15	80.5	"	.12	52.2	365	
	16-23	80.9	"	.11	48.1	385	
	24-30	77.4	"	.08	33.5	234	
Dec. '42	1-8	74.5	"	.14	56.4	452	1,560
	9-16	71.3	"	.16	61.6	493	
	17-24	55.5	"	.13	39.0	312	
	25-31	57.1	"	.14	43.2	303	
Jan. '43	1-8	85.7	"	.23	106.7	853	3,443
	9-16	86.1	"	.20	93.0	744	
	17-24	84.5	"	.20	91.4	731	
	25- 31	134	"	.22	159.5	1,115	
Feb. '43	1-7	159	"	.23	198.0	1,385	4,918
	8-14	142	"	.23	176.7	1,235	
	15-21	125	"	.25	169.0	1,183	
	22-28	128	"	.23	159,2	1,115	
Mar. '43	1-8	122	"	.22	145.2	1,162	8,812
	9-16	127	"	.30	206.0	1,650	
	17-24	296	"	.24	384.0	3,075	
	25-31	297	"	.26	417.5	2,925	
Apr. '43	1-8	265	"	.34	487.0	3,900	10,920
	9-15	214	"	.36	416.5	2,920	
	16-23	187	"	.30	303.0	2,425	
	24-30	170	"	.26	239.0	1,675	
May '43	1-8	102	"	.17	93.9	751	2,608
	9-16	56.8	"	.17	52.3	418	
	17-24	70.5	"	.22	83.9	672	
	25-31	72.5	"	.28	109.7	767	
June '43	1-8	86.8	"	.14	66	528	1,783
	9-15	82,7	"	.14	63	441	
	16-23	78.6	"	.12	51	408	
	24-30	89,3	"	.12	58	406	

MT-1

YAHARA AT OUTLET OF MENDOTA

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Sol.P. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	39.6	5.41	.02	4.2	34	97
	9-16	35.8	"	.02	3.9	31	
	17-24	44.3	"	.01	2.4	19	
	25-31	36.4	"	.01	1.9	13	
Aug. '42	1-8	34.4	"	.01	1.9	15	59
	9- 16	31.1	"	.01	1.7	14	
	17-24	40.9	"	.01	2.0	16	
	25-31	43.0	"	.01	2.0	14	
Sept. '42	1-8	43.0	"	.00	--	--	15
	9-15	39.4	"	.00	--	--	
	16-23	36.4	"	.01	1.9	15	
	24-30	38.7	"	.00	--	--	
Oct. '42	1-8	36.9	"	.01	2.0	16	66
	9-16	36.9	"	.01	2.0	16	
	17-24	34.3	"	.01	1.9	15	
	25-31	24.6	"	.02	2.7	19	
Nov. '42	1-8	57.8	"	.02	6.3	50	236
	9-15	80.5	"	.02	8.2	57	
	16-23	80.9	"	.02	8.8	70	
	24-30	77.4	"	.02	8.4	59	
Dec. '42	1-8	74.5	"	.01	4.0	32	172
	9-16	71.3	"	.02	7.7	62	
	17-24	55.5	"	.01	3.0	24	
	25-31	57.1	"	.025	7.7	54	
Jan. '43	1-8	85.7	"	.015	7.0	56	304
	9-16	86.1	"	.02	9.3	74	
	17-24	84.5	"	.02	9.1	73	
	25-31	134	"	.02	14.5	101	
Feb. '43	1-7	159	"	.02	17.2	120	443
	8-14	142	"	.02	15.4	108	
	15-21	125	"	.02	13.5	94	
	22-28	128	"	.025	17.3	121	
Mar. '43	1-8	122	"	.01	6.6	53	686
	9-16	127	"	.025	17.2	137	
	17-24	296	"	.03	48.0	384	
	25-31	297	"	.01	16.0	112	
Apr. '43	1-8	265	"	.01	14.3	114	307
	9-15	214	"	.01	11.5	81	
	16-23	187	"	.01	10.0	80	
	24-30	170	"	.005	4.6	32	
May '43	1-8	102	"	.01	5.5	44	127
	9-16	56.8	"	.01	3.1	25	
	17-24	70.5	"	.01	3.9	31	
	25-31	72.5	"	.01	3.9	27	
June '43	1-8	86.8	"	.01	4.7	38	138
	9-15	82.7	"	.01	4.5	32	
	16-23	78.6	"	.01	4.2	34	
	24-30	89.3	"	.01	4.8	34	

MT-1

YAHARA R. AT OUTLET OF MENDOTA

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Vol.S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	39.6	5.41				
	9-16	35.8	"				
	17-24	44.3	"				
	25-31	36.4	"				
Aug. '42	1-8	34.4	"	3.5	650	5,200	22,950
	9-16	31.1	"	3.5	588	4,700	
	17-24	40.9	"	3.7	818	6,550	
	25-31	43.0	"	4.0	930	6,500	
Sept. '42	1-8	43.0	"	4.0	930	7,440	21,464
	9-15	39.4	"	3.3	702	4,914	
	16-23	36.4	"	2.5	478	3,820	
	24-30	38.7	"	4.5	766	5,290	
Oct. '42	1-8	36.9	"	4.0	798	6,380	39,610
	9-16	36.9	"	14.5	2,890	23,100	
	17-24	34.3	"	1.5	278	2,220	
	25-31	24.6	"	8.5	1,130	7,910	
Nov. '42	1-8	57.8	"	1.0	312	2,500	19,920
	9-15	80.5	"	1.5	616	4,310	
	16-23	80.9	"	2.5	1,090	8,720	
	24-30	77.4	"	1.5	628	4,390	
Dec. '42	1-8	74.5	"	3.0	1,210	9,680	23,310
	9-16	71.3	"	2.0	770	6,150	
	17-24	55.5	"	1.5	450	3,600	
	25-31	57.1	"	1.8	555	3,880	
Jan. '43	1-8	85.7	"	2.0	927	7,420	27,220
	9-16	86.1	"	1.8	837	6,700	
	17-24	84.5	"	1.5	685	5,470	
	25-31	134	"	1.5	1,090	7,630	
Feb. '43	1-7	159	"	0.5	430	3,010	20,410
	8-14	142	"	1.0	770	5,390	
	15-21	125	"	1.0	676	4,730	
	22-28	128	"	1.5	1,040	7,280	
Mar. '43	1-8	122	"	0.5	330	2,640	55,540
	9-16	127	"	0.0	----	----	
	17-24	296	"	1.5	2,400	19,200	
	25-31	297	"	3.0	4,820	33,700	
Apr. '43	1-8	265	"	2.0	2,870	22,950	79,510
	9-15	214	"	3.0	3,470	24,300	
	16-23	187	"	2.0	2,020	16,160	
	24-30	170	"	2.5	2,300	16,100	
May '43	1-8	102	"	5.5	3,030	24,240	47,260
	9-16	56.8	"	3.3	1,010	8,080	
	17-24	70.5	"	2.8	1,080	8,640	
	25-31	72.5	"	2.3	900	6,300	
June '43	1-8	86.8	"	5.0	2,345	18,750	63,050
	9-15	82.7	"	2.8	1,250	8,750	
	16-23	78.6	"	4.5	1,910	15,300	
	24-30	89.3	"	6.0	2,890	20,250	

MT-1 **YAHARA RIVER AT OUTLET OF MENDOTA**

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Org.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	39.6	5.41	.28	60	480	2,339
	9-16	35.8	"	.32	62	496	
	17-24	44.3	"	.40	96	768	
	25-31	36.4	"	.43	85	595	
Aug. '42	1-8	34.4	"	.30	56	448	1,870
	9-16	31.1	"	.34	57	456	
	17-24	40.9	"	.28	62	496	
	25-31	43.0	"	.29	67	470	
Sept. '42	1-8	43.0	"	.24	56	448	1,867
	9-15	39.4	"	.27	58	406	
	16-23	36.4	"	.38	75	600	
	24-30	38.7	"	.28	59	413	
Oct. '42	1-8	36.9	"	.32	63	504	2,014
	9-16	36.9	"	.37	74	592	
	17-24	34.3	"	.30	56	448	
	25-31	24.6	"	.50	67	470	
Nov. '42	1-8	57.8	"	.37	116	928	4,308
	9-15	80.5	"	.35	152	1,065	
	16-23	80.9	"	.37	162	1,295	
	24-30	77.4	"	.35	146	1,020	
Dec. '42	1-8	74.5	"	.32	128	1,025	4,340
	9-16	71.3	"	.39	150	1,200	
	17-24	55.5	"	.45	135	1,080	
	25-31	57.1	"	.48	148	1,035	
Jan. '43	1-8	85.7	"	.45	209	1,672	6,672
	9-16	86.1	"	.40	186	1,490	
	17-24	84.5	"	.35	160	1,280	
	25-31	134	"	.44	319	2,230	
Feb. '43	1-7	159	"	.37	318	2,225	8,635
	8-14	142	"	.40	307	2,150	
	15-21	125	"	.40	270	1,890	
	22-28	128	"	.49	339	2,370	
Mar. '43	1-8	122	"	.33	218	1,745	12,975
	9-16	127	"	.59	405	3,240	
	17-24	296	"	.37	592	4,740	
	25-31	297	"	.29	465	3,250	
Apr. '43	1-8	265	"	.46	658	5,260	14,630
	9-15	214	"	.41	474	3,320	
	16-23	187	"	.43	435	3,480	
	24-30	170	"	.40	367	2,570	
May '43	1-8	102	"	.51	281	2,250	5,715
	9-16	56.8	"	.45	138	1,105	
	17-24	70.5	"	.37	141	1,130	
	25-31	72.5	"	.45	176	1,230	
June '43	1-8	86.8	"	.41	192	1,535	6,230
	9-15	82.7	"	.45	201	1,410	
	16-23	78.6	"	.43	183	1,465	
	24-30	89.3	"	.54	260	1,820	

MT-1R YAHARA RIVER AT RUTLEDGE STREET

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Inorg.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	39.6	5.41	.82	176	1,405	4,489
	9-16	35.8	"	.82	159	1,270	
	17-24	44.3	"	.63	151	1,208	
	25-31	36.4	"	.44	87	606	
Aug. '42	1-8	34.4	"	.37	69	552	3,033
	9-16	31.3	"	.45	76	608	
	17-24	40.9	"	.59	130	1,040	
	25-31	43.0	"	.47	119	833	
Sept. '42	1-8	43.0	"	1.16	270	2,160	5,502
	9-15	39.4	"	.96	205	1,435	
	16-23	36.4	"	.29	57	457	
	24-30	38.7	"	.99	207	1,450	
Oct. '42	1-8	36.9	"	.41	82	655	3,770
	9-16	36.9	"	.58	115	924	
	17-24	34.3	"	1.14	212	1,698	
	25-31	24.6	"	.53	70	493	
Nov. '42	1-8	57.8	"	.44	138	1,095	4,875
	9-15	80.5	"	.47	204	1,430	
	16-23	80.9	"	.22	96	770	
	24-30	77.4	"	.54	226	1,580	
Dec. '42	1-8	74.5	"	.37	149	1,192	3,785
	9-16	71.3	"	.31	120	956	
	17-24	55.5	"	.51	153	1,227	
	25-31	57.1	"	.19	59	410	
Jan. '43	1-8	85.7	"	.85	394	3,155	10,014
	9-16	86.1	"	.67	312	2,492	
	17-24	84.5	"	.49	224	1,792	
	25-31	134	"	.51	369	2,575	
Feb. '43	1-7	159	"	.46	396	2,770	12,425
	8-14	142	"	.62	476	3,330	
	15-21	125	"	.59	399	2,790	
	22-28	128	"	.73	505	3,535	
Mar. '43	1-8	122	"	.56	363	2,905	14,435
	9-16	127	"	.44	302	2,415	
	17-24	296	"	.44	704	5,635	
	25-31	297	"	.31	498	3,480	
Apr. '43	1-8	265	"	.44	630	5,040	17,130
	9-15	214	"	.60	694	4,860	
	16-23	187	"	.60	606	4,850	
	24-30	170	"	.37	340	2,380	
May '43	1-8	102	"	.43	237	1,895	6,094
	9-16	56.8	"	.26	80	639	
	17-24	70.5	"	.70	267	2,135	
	25-31	72.5	"	.54	212	1,425	
June '43	1-8	86.8	"	.84	394	3,150	7,365
	9-15	82.7	"	.39	175	1,225	
	16-23	78.6	"	.41	175	1,400	
	24-30	89.3	"	.47	227	1,590	

MT-1R 109< YAHARA RIVER AT RUTLEDGE STREET

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Sol.P. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	39.6	5.41	.02	4.2	34	
	9-16	35.8	"	.02	3.9	31	
	17-24	44.3	"	.01	2.4	19	
	25-31	36.4	"	.01	1.9	13	97
Aug. '42	1-8	34.4	"	.01	1.9	15	
	9-16	31.1	"	.01	1.7	14	
	17-24	40.9	"	.01	2.0	16	
	25-31	43.0	"	.01	2.0	14	59
Sept. '42	1-8	43.0	"	.01	2.0	16	
	9-15	39.4	"	.00	--	--	
	16-23	36.4	"	.01	1.9	15	
	24-30	38.7	"	.00	--	--	31
Oct. '42	1-8	36.9	"	.01	2.0	16	
	9-16	36.9	"	.01	2.0	16	
	17-24	34.3	"	.02	3.7	30	
	25-31	24.6	"	.03	4.0	28	90
Nov. '42	1-8	57.8	"	.02	6.3	50	
	9-15	80.5	"	.04	16.4	114	
	16-23	80.9	"	.02	8.8	70	
	24-30	77.4	"	.01	4.2	30	264
Dec. '42	1-8	74.5	"	.015	6.0	48	
	9-16	71.3	"	.02	7.7	62	
	17-24	55.5	"	.01	3.0	24	
	25-31	57.1	"	.025	7.7	54	188
Jan. '43	1-8	85.7	"	.025	11.6	93	
	9-16	86.1	"	.020	9.3	74	
	17-24	84.5	"	.020	9.1	73	
	25-31	134	"	.010	7.3	51	291
Feb. '43	1-7	159	"	.02	17.2	120	
	8-14	142	"	.02	15.4	108	
	15-21	125	"	.02	13.5	94	
	22-28	128	"	.01	6.0	42	364
Mar. '43	1-8	122	"	.01	6.6	53	
	9-16	127	"	.04	27.5	220	
	17-24	296	"	.04	64.0	512	
	25-31	297	"	.01	16.0	112	897
Apr. '43	1-8	265	"	.015	21.5	172	
	9-15	214	"	.01	11.0	77	
	16-23	187	"	.01	10.0	80	
	24-30	170	"	.01	9.0	63	392
May '43	1-8	102	"	.01	5.5	44	
	9-16	56.8	"	.01	3.1	25	
	17-24	70.5	"	.01	3.9	31	
	25-31	72.5	"	.02	7.8	54	154
June '43	1-8	86.8	"	.015	7.1	57	
	9-15	82.7	"	.012	5.4	38	
	16-23	78.6	"	.01	4.3	34	
	24-30	89.3	"	.01	4.8	34	163

MT-1R

YAHARA RIVER AT RUTLEDGE STREET

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Vol.S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	39.6	5.41	8.5	1,770	14,150	30,950
	9-16	35.8	"	3.5	677	5,410	
	17-24	44.3	"	3.5	838	6,700	
	25-31	36.4	"	3.5	670	4,690	
Aug. '42	1-8	34.4	"	7.5	1,395	11,150	30,700
	9-16	31.1	"	4.0	672	5,370	
	17-24	40.9	"	4.8	1,060	8,480	
	25-31	43.0	"	3.5	815	5,700	
Sept. '42	1-8	43.0	"	4.5	1,045	8,360	24,090
	9-15	39.4	"	4.8	1,020	7,140	
	16-23	36.4	"	2.5	478	3,820	
	24-30	38.7	"	4.0	682	4,770	
Oct. '42	1-8	36.9	"	5.5	1,095	8,760	38,530
	9-16	36.9	"	12.0	2,390	19,100	
	17-24	34.3	"	5.0	927	7,420	
	25-31	24.6	"	3.5	465	3,250	
Nov. '42	1-8	57.8	"	1.0	312	2,500	33,200
	9-15	80.5	"	5.5	2,260	15,800	
	16-23	80.9	"	3.0	1,310	10,500	
	24-30	77.4	"	1.5	628	4,400	
Dec. '42	1-8	74.5	"	3.0	1,210	9,680	23,940
	9-16	71.3	"	1.5	578	4,620	
	17-24	55.5	"	1.5	450	3,600	
	25-31	57.1	"	2.8	863	6,040	
Jan. '43	1-8	85.7	"	4.0	1,850	14,800	54,000
	9-16	86.1	"	3.5	1,630	13,050	
	17-24	84.5	"	3.0	1,370	10,950	
	25-31	134	"	3.0	2,170	15,200	
Feb. '43	1-7	159	"	2.0	1,720	12,020	59,320
	8-14	142	"	2.5	1,920	13,420	
	15-21	125	"	0.5	340	2,380	
	22-28	128	"	6.5	4,500	31,500	
Mar. '43	1-8	122	"	1.5	990	7,920	291,790
	9-16	127	"	14.0	9,600	76,800	
	17-24	296	"	14.0	22,400	179,000	
	25-31	297	"	2.5	4,010	28,070	
Apr. '43	1-8	265	"	2.5	3,580	28,600	104,480
	9-15	214	"	3.5	4,040	28,280	
	16-23	187	"	3.5	3,540	28,300	
	24-30	170	"	3.0	2,760	19,300	
May '43	1-8	102	"	5.0	2,760	22,100	61,350
	9-16	56.8	"	5.3	1,630	13,050	
	17-24	70.5	"	4.5	1,740	13,900	
	25-31	72.5	"	4.5	1,760	12,300	
June '43	1-8	86.8	"	3.5	1,640	13,100	51,230
	9-15	82.7	"	3.5	1,570	11,000	
	16-23	78.6	"	4.5	1,915	15,300	
	24-30	89.3	"	3.5	1,690	11,830	

MT-1R

YAHARA RIVER AT RUTLEDGE STREET

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Org.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	39.6	5.41	.28	60	480	2,379
	9-16	35.8	"	.32	62	496	
	17-24	44.3	"	.42	101	808	
	25-31	36.4	"	.43	85	595	
Aug. '42	1-8	34.4	"	.30	56	448	2,119
	9-16	31.3	"	.37	63	504	
	17-24	40.9	"	.34	75	600	
	25-31	43.0	"	.35	81	567	
Sept. '42	1-8	43.0	"	.37	86	688	2,211
	9-15	39.4	"	.30	64	448	
	16-23	36.4	"	.41	81	648	
	24-30	38.7	"	.29	61	427	
Oct. '42	1-8	36.9	"	.56	112	896	3,220
	9-16	36.9	"	.61	122	976	
	17-24	34.3	"	.59	109	872	
	25-31	24.6	"	.51	68	476	
Nov. '42	1-8	57.8	"	.20	62	496	5,151
	9-15	80.5	"	.40	174	1,220	
	16-23	80.9	"	.55	241	1,930	
	24-30	77.4	"	.49	215	1,505	
Dec. '42	1-8	74.5	"	.49	196	1,565	4,961
	9-16	71.3	"	.48	185	1,480	
	17-24	55.5	"	.44	132	1,055	
	25-31	57.1	"	.40	123	861	
Jan. '43	1-8	85.7	"	.91	421	3,370	11,770
	9-16	86.1	"	.72	335	2,680	
	17-24	84.5	"	.52	235	2,680	
	25-31	134	"	.60	434	3,040	
Feb. '43	1-7	159	"	.60	516	3,610	12,890
	8-14	142	"	.47	360	2,520	
	15-21	125	"	.55	372	2,600	
	22-28	128	"	.86	595	4,160	
Mar. '43	1-8	122	"	.37	244	1,950	17,040
	9-16	127	"	.63	433	3,460	
	17-24	296	"	.61	977	7,820	
	25-31	297	"	.34	545	3,810	
Apr. '43	1-8	265	"	.41	587	4,700	15,200
	9-15	214	"	.43	498	3,490	
	16-23	187	"	.46	466	3,730	
	24-30	170	"	.51	468	3,280	
May '43	1-8	102	"	.58	319	2,550	6,275
	9-16	56.8	"	.44	135	1,070	
	17-24	70.5	"	.43	164	1,310	
	25-31	72.5	"	.49	192	1,345	
June '43	1-8	86.8	"	.56	263	2,100	6,755
	9-15	82.7	"	.46	206	1,440	
	16-23	78.6	"	.52	221	1,765	
	24-30	89.3	"	.43	207	1,450	

MT-2E **EAST BRANCH STARKWEATHER CREEK**

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Inorg.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
	1-8	4.7	5.41	2.57	65.2	522	
July '42	9-16	4.9	"	1.66	44.1	365	1,121
	17-24	4.9	"	.14	3.7	30	
	25-31	3.2	"	1.69	29.2	204	
	1-8	6.2	"	.93	31.2	249	
Aug. '42	9-16	4.2	"	.18	4.1	33	382
	17-24	3.4	"	.51	9.4	75	
	25-31	3.1	"	.21	3.5	25	
	1-8	3.3	"	.92	16.4	131	
Sept. '42	9-15	4.3	"	.91	21.2	148	1,492
	16-23	7.0	"	1.72	65.1	521	
	24-30	5.4	"	3.39	98.9	692	
	1-8	3.7	"	.88	17.6	141	
Oct. '42	9-16	4.5	"	1.66	40.4	323	1,600
	17-24	3.6	"	2.09	40.7	326	
	25-31	5.3	"	4.04	115.8	810	
	1-8	5.6	"	3.28	99.4	794	
Nov. '42	9-15	7.6	"	3.70	152.0	1,070	3,284
	16-23	5.0	"	3.74	101.0	808	
	24-30	4.9	"	3.30	87.5	612	
	1-8	5.1	"	3.26	90.0	720	
Dec. '42	9-16	5.0	"	3.59	96.8	774	3,070
	17-24	4.9	"	3.45	91.5	732	
	25-31	6.6	"	3.38	120.5	844	
	1-8	5.6	"	3.30	100.0	800	
Jan. '43	9-16	5.6	"	3.34	101.0	808	3,017
	17-24	5.4	"	3.37	98.5	787	
	25-31	5.1	"	3.23	89.0	622	
	1-7	5.0	"	2.67	72.0	504	
Feb. '43	8-14	5.0	"	3.27	88.2	616	3,540
	15-21	8.3	"	3.27	147.0	1,030	
	22-28	12.9	"	2.85	199.0	1,390	
	1-8	6.9	"	3.46	129.0	1,062	
Mar. '43	9-16	28.1	"	2.30	350.0	2,800	6,752
	17-24	16.8	"	2.30	209.0	1,670	
	25-31	9.9	"	3.26	174.5	1,220	
	1-8	7.3	"	3.15	124.3	995	
Apr. '43	9-15	6.2	"	3.20	107.0	749	3,179
	16-23	5.8	"	3.20	100.5	804	
	24-30	5.4	"	3.09	90.2	631	
	1-8	5.1	"	3.06	84.3	674	
May '43	9-16	5.5	"	3.39	101.0	808	2,820
	17-24	5.6	"	3.06	92.6	740	
	25-31	5.4	"	2.93	85.5	598	
	1-8	4.6	"	2.80	69.6	557	
June '43	9-15	4.4	"	2.92	69.5	486	2,209
	16-23	4.9	"	2.51	66.5	532	
	24-30	6.7	"	2.50	90.5	634	

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EAST BRANCH STARKWEATHER CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc Sol.P. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	4.7	5.41	.04	1.02	8.16	22.7
	9-16	4.9	"	.04	1.06	8.48	
	17-24	4.9	"	.02	.53	4.24	
	25-31	3.2	"	.015	.26	1.82	
Aug. '42	1-8	6.2	"	.015	.50	4.00	9.3
	9-16	4.2	"	.015	.34	2.72	
	17-24	3.4	"	.010	.18	1.44	
	25-31	3.1	"	.01	.16	1.12	
Sept. '42	1-8	3.3	"	.025	.45	3.70	24.5
	9-15	4.3	"	.04	.93	6.51	
	16-23	7.0	"	.02	.76	6.08	
	24-30	5.4	"	.04	1.17	8.19	
Oct. '42	1-8	3.7	"	.02	.40	3.20	10.2
	9-16	4.5	"	.01	.24	1.92	
	17-24	3.6	"	.02	.39	3.12	
	25-31	5.3	"	.01	.28	1.96	
Nov. '42	1-8	5.6	"	.01	.30	2.40	21.9
	9-15	7.6	"	.04	1.64	11.48	
	16-23	5.0	"	.02	.54	4.32	
	24-30	4.9	"	.02	.53	3.71	
Dec. '42	1-8	5.1	"	.01	.28	2.24	15.8
	9-16	5.0	"	.02	.54	4.32	
	17-24	4.9	"	.02	.53	4.24	
	25-31	6.6	"	.02	.71	4.97	
Jan. '43	1-8	5.6	"	.01	.30	2.40	11.5
	9-16	5.6	"	.015	.45	3.60	
	17-24	5.4	"	.015	.44	3.52	
	25-31	5.1	"	.010	.28	1.96	
Feb. '43	1-7	5.0	"	.02	.54	3.78	23.5
	8-14	5.0	"	.01	.27	1.89	
	15-21	8.3	"	.01	.45	3.15	
	22-28	12.9	"	.03	2.10	14.70	
Mar. '43	1-8	6.9	"	.01	.37	2.96	84.7
	9-16	28.1	"	.04	6.10	48.80	
	17-24	16.8	"	.04	3.64	29.12	
	25-31	9.9	"	.01	.54	3.78	
Apr. '43	1-8	7.3	"	.01	.40	3.20	10.1
	9-15	6.2	"	.01	.34	2.38	
	16-23	5.8	"	.01	.31	2.48	
	24-30	5.4	"	.01	.29	2.03	
May '43	1-8	5.1	"	.025	.69	5.52	19.3
	9-16	5.5	"	.02	.60	4.80	
	17-24	5.6	"	.02	.61	4.88	
	25-31	5.4	"	.02	.58	4.06	
June '43	1-8	4.6	"	.015	.37	3.00	11.7
	9-15	4.4	"	.01	.24	1.68	
	16-23	4.9	"	.015	.40	3.20	
	24-30	6.7	"	.015	.54	3.78	

MT-2E

EAST BRANCH STARKWEATHER CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc Vol.S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	4.7	5.41	17.0	431	3,450	5,551
	9-16	4.9	"	4.0	106	848	
	17-24	4.9	"	4.5	119	952	
	25-31	3.2	"	2.5	43	301	
Aug. '42	1-8	6.2	"	7.0	235	1,880	5,626
	9-16	4.2	"	12.0	272	2,175	
	17-24	3.4	"	5.5	101	808	
	25-31	3.1	"	6.5	109	763	
Sept. '42	1-8	3.3	"	2.0	36	288	3,269
	9-15	4.3	"	5.0	116	812	
	16-23	7.0	"	4.8	182	1,455	
	24-30	5.4	"	3.5	102	714	
Oct. '42	1-8	3.7	"	1.0	20	160	3,794
	9-16	4.5	"	13.0	316	2,530	
	17-24	3.6	"	4.5	88	705	
	25-31	5.3	"	2.0	57	399	
Nov. '42	1-8	5.6	"	1.0	30	240	3,163
	9-15	7.6	"	6.5	267	1,870	
	16-23	5.0	"	4.0	108	864	
	24-30	4.9	"	1.0	27	189	
Dec. '42	1-8	5.1	"	5.0	138	1,105	4,139
	9-16	5.0	"	4.0	108	864	
	17-24	4.9	"	5.5	146	1,170	
	25-31	6.6	"	4.0	143	1,000	
Jan. '43	1-8	5.6	"	2.5	76	608	2,831
	9-16	5.6	"	3.0	91	728	
	17-24	5.4	"	3.5	102	816	
	25-31	5.1	"	3.5	97	679	
Feb. '43	1-7	5.0	"	2.0	54	378	4,496
	8-14	5.0	"	2.0	54	378	
	15-21	8.3	"	2.0	90	630	
	22-28	12.9	"	6.5	454	3,110	
Mar. '43	1-8	6.9	"	2.5	93	744	357,544
	9-16	28.1	"	181.0	27,450	220,000	
	17-24	16.8	"	184.0	16,700	133,800	
	25-31	9.9	"	8.0	429	3,000	
Apr. '43	1-8	7.3	"	2.5	99	792	2,447
	9-15	6.2	"	3.0	100	700	
	16-23	5.8	"	3.0	94	752	
	24-30	5.4	"	1.0	29	203	
May '43	1-8	5.1	"	39.0	1,070	8,560	11,958
	9-16	5.5	"	3.0	89	712	
	17-24	5.6	"	9.0	272	2,175	
	25-31	5.4	"	2.5	73	511	
June '43	1-8	4.6	"	14.5	385	3,080	5,712
	9-15	4.4	"	4.0	95	665	
	16-23	4.9	"	4.5	119	952	
	24-30	6.7	"	4.0	145	1,015	

MT-2E 115< EAST BRANCH STARKWEATHER CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Org.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	4.7	5.41	.75	19	152	417
	9-16	4.9	"	.55	15	120	
	17-24	4.9	"	.47	12	96	
	25-31	3.2	"	.41	7	49	
Aug. '42	1-8	6.2	"	.52	17	136	471
	9-16	4.2	"	1.11	25	200	
	17-24	3.4	"	.51	9	72	
	25-31	3.1	"	.55	9	63	
Sept. '42	1-8	3.3	"	.25	4	32	499
	9-15	4.3	"	.51	12	84	
	16-23	7.0	"	.86	33	264	
	24-30	5.4	"	.59	17	119	
Oct. '42	1-8	3.7	"	.32	6	48	195
	9-16	4.5	"	.33	8	64	
	17-24	3.6	"	.30	6	48	
	25-31	5.3	"	.18	5	35	
Nov. '42	1-8	5.6	"	.40	12	96	328
	9-15	7.6	"	.44	18	126	
	16-23	5.0	"	.30	8	64	
	24-30	4.9	"	.24	6	42	
Dec. '42	1-8	5.1	"	.29	8	64	216
	9-16	5.0	"	.24	6	48	
	17-24	4.9	"	.23	6	48	
	25-31	6.6	"	.23	8	56	
Jan. '43	1-8	5.6	"	.24	7	56	202
	9-16	5.6	"	.22	7	56	
	17-24	5.4	"	.20	6	48	
	25-31	5.1	"	.21	6	42	
Feb. '43	1-7	5.0	"	.23	6	42	441
	8-14	5.0	"	.19	5	35	
	15-21	8.3	"	.47	21	147	
	22-28	12.9	"	.45	31	217	
Mar. '43	1-8	6.9	"	.12	5	40	6,120
	9-16	28.1	"	3.60	546	4,360	
	17-24	16.8	"	2.08	189	1,510	
	25-31	9.9	"	.56	30	210	
Apr. '43	1-8	7.3	"	.30	12	96	299
	9-15	6.2	"	.20	7	49	
	16-23	5.8	"	.21	7	56	
	24-30	5.4	"	.48	14	98	
May '43	1-8	5.1	"	.74	20	160	299
	9-15	5.5	"	.20	6	48	
	17-24	5.6	"	.24	7	56	
	25-31	5.4	"	.18	5	35	
June '43	1-8	4.6	"	.43	11	88	243
	9-15	4.4	"	.22	5	35	
	16-23	4.9	"	.32	8	64	
	24-31	6.7	"	.21	8	56	

MT-2W

WEST BRANCH-STARKWEATHER CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Inorg. N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	4.6	5.41	1.06	26	208	782
	9-16	4.8	"	1.06	28	224	
	17-24	4.9	"	1.06	28	224	
	25-31	3.2	"	1.06	18	126	
Aug. '42	1-8	6.0	"	.32	10	80	174
	9-16	3.6	"	.32	6	48	
	17-24	2.0	"	.32	4	32	
	25-31	1.3	"	.32	2	14	
Sept. '42	1-8	1.5	"	.63	5	40	916
	9-15	2.2	"	2.87	34	238	
	16-23	5.9	"	1.58	50	400	
	24-30	4.0	"	1.58	34	233	
Oct. '42	1-8	3.5	"	1.70	32	256	710
	9-16	3.8	"	1.01	21	168	
	17-24	2.4	"	.98	13	104	
	25-31	4.0	W	1.21	26	182	
Nov. '42	1-8	3.6	"	2.35	46	368	2,204
	9-15	9.3	"	1.92	97	679	
	16-23	4.2	"	3.90	86	688	
	24-30	3.7	"	3.37	67	469	
Dec. '42	1-8	2.8	"	2.65	40	320	1,863
	9-16	2.2	"	2.62	31	248	
	17-24	3.1	"	2.48	42	336	
	25-31	8.8	"	2.89	137	959	
Jan. '43	1-8	3.7	"	3.31	66	528	1,313
	9-16	2.9	"	2.94	46	368	
	17-24	2.3	"	2.57	32	256	
	25-30	1.8	"	2.34	23	161	
Feb. '43	1-7	1.5	"	2.86	23	161	5,864
	8-14	1.5	"	2.66	22	154	
	15-21	14.4	"	2.66	207	1,449	
	22-28	13.8	"	7.84	586	4,100	
Mar. '43	1-8	5.1	"	3.99	110	880	10,356
	9-16	27.1	"	3.02	442	3,536	
	17-24	13.8	"	7.36	550	4,400	
	25-31	7.4	"	5.50	220	1,540	
Apr. '43	1-8	5.0	"	2.29	62	496	2,492
	9-15	4.7	"	3.78	96	672	
	16-23	5.4	"	4.10	120	960	
	24-30	2.9	"	3.29	52	364	
May '43	1-8	2.5	"	1.84	25	200	7,166
	9-16	4.8	"	12.14	325	2,600	
	17-24	4.7	"	10.88	277	2,206	
	25-31	4.2	"	13.59	308	2,160	
June '43	1-8	4.4	"	13.5	321	2,570	9,870
	9-15	3.8	"	10.0	210	1,470	
	16-23	4.7	"	7.3	186	1,490	
	24-30	10.6	"	10.8	620	4,340	

MT-2W 117< WEST BRANCH-STARKWEATHER CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Sol.P. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	4.6	5.41	.03	.75	6.0	22.1
	9-16	4.8	"	.03	.78	6.2	
	17-24	4.9	"	.03	.79	6.3	
	25-31	3.2	"	.03	.52	3.6	
Aug. '42	1-8	6.0	"	.02	.65	5.2	11.1
	9-16	3.6	"	.02	.39	3.1	
	17-24	2.0	"	.02	.22	1.8	
	25-31	1.3	"	.02	.14	1.0	
Sept. '42	1-8	1.5	"	.03	.24	1.9	37.8
	9-15	2.2	"	.03	.36	2.5	
	16-23	5.9	"	.03	.96	7.7	
	24-30	4.0	"	.17	3.67	25.7	
Oct. '42	1-8	3.5	"	.02	.38	3.0	8.5
	9-16	3.8	"	.01	.20	1.6	
	17-24	2.4	"	.01	.13	1.0	
	25-31	4.0	"	.02	.42	2.9	
Nov. '42	1-8	3.6	"	.01	.19	1.5	18.5
	9-15	9.3	"	.03	1.51	10.6	
	16-23	4.2	"	.02	.45	3.6	
	24-30	3.7	"	.02	.40	2.8	
Dec. '42	1-8	2.8	"	.015	.23	1.9	31.8
	9-16	2.2	"	.02	.24	1.9	
	17-24	3.1	"	.06	1.00	8.0	
	25-31	8.8	"	.06	2.85	20.0	
Jan. '43	1-8	3.7	"	.04	.80	6.4	23.0
	9-16	2.9	"	.06	.94	7.5	
	17-24	2.3	"	.06	.75	6.0	
	25-31	1.8	"	.045	.44	3.1	
Feb. '43	1-7	1.5	"	.035	.28	2.0	73.2
	8-14	1.5	"	.025	.20	1.4	
	15-21	14.4	"	.08	6.24	43.6	
	22-28	13.8	"	.05	3.74	26.2	
Mar. '43	1-8	5.1	"	.04	1.10	8.8	166.4
	9-16	27.1	"	.08	11.60	92.8	
	17-24	13.8	"	.08	6.00	48.0	
	25-31	7.4	"	.06	2.40	16.8	
Apr. '43	1-8	5.0	"	.05	1.35	10.8	59.7
	9-15	4.7	"	.05	1.27	8.9	
	16-23	5.4	"	.03	.38	7.1	
	24-30	2.9	"	.03	.47	32.9	
May '43	1-8	2.5	"	.025	.34	2.7	1,794.7
	9-16	4.8	"	3.00	77.8	622.0	
	17-24	4.7	"	3.04	77.4	620.0	
	25-31	4.2	"	3.46	78.5	550.0	
June '43	1-8	4.4	"	3.20	76.0	608.0	3,657.0
	9-15	3.8	"	4.04	81.0	567.0	
	16-23	4.7	"	3.60	91.5	732.0	
	24-30	10.6	"	4.36	250.0	1,750.0	

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WEST BRANCH STARKWEATHER CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg. Conc. Vol.S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	4.6	5.41	13.0	323	2,580	9,605
	9-16	4.8	"	13.0	337	2,700	
	17-24	4.9	"	13.0	344	2,750	
	25-31	3.2	"	13.0	225	1,575	
Aug. '42	1-8	6.0	"	14.5	470	3,760	7,990
	9-16	3.6	"	14.5	282	2,255	
	17-24	2.0	"	14.5	157	1,260	
	25-31	1.3	"	14.5	102	715	
Sept. '42	1-8	1.5	"	15.5	126	1,010	11,145
	9-15	2.2	"	16.8	200	1,400	
	16-23	5.9	"	21.5	685	5,480	
	24-30	4.0	"	21.5	465	3,255	
Oct. '42	1-8	3.5	"	8.5	161	1,290	5,095
	9-16	3.8	"	13.0	267	2,140	
	17-24	2.4	"	11.0	143	1,140	
	25-31	4.0	"	3.5	75	525	
Nov. '42	1-8	3.6	"	4.0	78	625	23,295
	9-15	9.3	"	59.0	2,970	20,800	
	16-23	4.2	"	9.5	216	1,730	
	24-30	3.7	"	1.0	20	140	
Dec. '42	1-8	2.8	"	5.5	83	664	2,322
	9-16	2.2	"	2.0	24	192	
	17-24	3.1	"	4.0	67	535	
	25-31	8.8	"	2.8	133	931	
Jan. '43	1-8	3.7	"	1.5	30	240	1,072
	9-16	2.9	"	2.5	39	312	
	17-24	2.3	"	3.5	44	352	
	25-31	1.8	"	2.5	24	168	
Feb. '43	1-7	1.5	"	4.5	37	259	22,085
	8-14	1.5	"	1.0	8	56	
	15-21	14.4	"	14.0	1,090	7,630	
	22-28	13.8	"	27.0	2,020	14,140	
Mar. '43	1-8	5.1	"	2.5	69	552	262,452
	9-16	27.1	"	125.0	18,300	146,500	
	17-24	13.8	"	130.5	9,750	79,000	
	25-31	7.4	"	13.0	5,200	36,400	
Apr. '43	1-8	5.0	"	4.0	108	860	2,689
	9-15	4.7	"	3.5	89	624	
	16-23	5.4	"	3.5	102	816	
	24-30	2.9	"	3.5	55	385	
May '43	1-8	2.5	"	6.0	81	648	8,458
	9-16	4.8	"	16.0	415	3,320	
	17-24	4.7	"	13.5	343	2,740	
	25-31	4.2	"	11.0	250	1,750	
June '43	1-8	4.4	"	23.0	547	4,380	15,240
	9-15	3.8	"	28.0	560	3,920	
	16-23	4.7	"	6.5	165	1,320	
	24-30	10.6	"	14.0	803	5,620	

MT-2W

STARKWEATHER CR., W. BR.

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Org.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	4.6	5.41	.65	16	128	477
	9-16	4.8	"	.65	17	136	
	17-24	4.9	"	.65	17	136	
	25-31	3.2	"	.65	11	77	
Aug. '42	1-8	6.0	"	.52	17	136	388
	9-16	3.6	"	1.11	22	176	
	17-24	2.0	"	.51	6	48	
	25-31	1.3	"	.55	4	28	
Sept. '42	1-8	1.5	"	.72	6	48	453
	9-15	2.2	"	.63	7	49	
	16-23	5.9	"	.84	27	216	
	24-30	4.0	"	.92	20	140	
Oct. '42	1-8	3.5	"	.54	10	80	264
	9-16	3.8	"	.39	10	80	
	17-24	2.4	"	.48	6	48	
	25-31	4.0	"	.35	8	56	
Nov. '42	1-8	3.6	"	.40	8	64	765
	9-15	9.3	"	1.50	75	525	
	16-23	4.2	"	.64	15	120	
	24-30	3.7	"	.40	8	56	
Dec. '42	1-8	2.8	"	.41	6	48	247
	9-16	2.2	"	.31	4	32	
	17-24	3.1	"	.36	6	48	
	25-31	8.8	"	.36	17	119	
Jan. '43	1-8	3.7	"	.39	10	80	165
	9-16	2.9	"	.33	5	40	
	17-24	2.3	"	.27	3	24	
	25-31	1.8	"	.29	3	21	
Feb. '43	1-7	1.5	"	.60	5	35	1,113
	8-14	1.5	"	.50	4	28	
	15-21	14.4	"	.40	31	217	
	22-28	13.8	"	1.60	119	833	
Mar. '43	1-8	5.1	"	.91	25	200	6,949
	9-16	27.1	"	3.51	514	4,110	
	17-24	13.8	"	3.76	280	2,240	
	25-31	7.4	"	1.42	57	399	
Apr. '43	1-8	5.0	"	.75	20	160	493
	9-15	4.7	"	.62	16	112	
	16-23	5.4	"	.63	18	144	
	24-30	2.9	"	.68	11	77	
May '43	1-8	2.5	"	.58	8	64	1,160
	9-16	4.8	"	2.04	53	424	
	17-24	4.7	"	2.20	56	448	
	25-31	4.2	"	1.42	32	224	
June '43	1-8	4.4	"	2.20	52	416	1,838
	9-15	3.8	"	3.32	66	462	
	16-23	4.7	"	1.40	36	288	
	24-30	10.6	"	1.67	96	672	

MT-3

MURPHYS CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Inorg.N. P.P.M.	Lbs. Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	3.1	5.41	.34	6	48	164
	9-16	3.6	"	.31	6	48	
	17-24	3.4	"	.27	5	40	
	25-31	2.6	"	.29	4	28	
Aug. '42	1-8	3.5	"	.23	4	32	93
	9-16	2.5	"	.10	1	8	
	17-24	2.5	"	.30	4	32	
	25-31	2.5	"	.21	3	21	
Sept. '42	1-8	4.2	"	.25	6	48	143
	9-15	4.7	"	.12	3	21	
	16-23	5.4	"	.14	4	32	
	24-30	3.8	"	.29	6	42	
Oct. '42	1-8	3.8	"	.15	3	24	83
	9-16	3.4	"	.09	2	16	
	17-24	2.5	"	.07	1	8	
	25-30	4.0	"	.23	5	35	
Nov. '42	1-8	5.0	"	.20	5	40	397
	9-15	8.2	"	.27	12	84	
	16-23	5.1	"	.51	14	112	
	24-30	4.8	"	.89	23	161	
Dec. '42	1-8	5.0	"	.67	18	144	611
	9-16	3.7	"	.58	12	96	
	17-24	4.1	"	.63	14	112	
	25-31	7.6	"	.89	37	259	
Jan. '43	1-8	5.9	"	1.14	36	288	1,010
	9-16	5.7	"	1.09	34	272	
	17-24	5.4	"	1.04	30	240	
	25-31	5.1	"	1.10	30	210	
Feb. '43	1-7	4.7	"	1.41	36	252	1,372
	8-14	4.2	"	1.33	30	210	
	15-21	5.0	"	1.32	36	252	
	22-28	13.7	"	1.27	94	658	
Mar. '43	1-8	7.2	"	1.22	48	384	2,244
	9-16	20.0	"	1.29	139	1,110	
	17-24	14.5	"	.90	71	568	
	25-31	9.8	"	.50	26	182	
Apr. '43	1-8	5.6	"	.90	27	216	904
	9-15	4.7	"	.73	19	133	
	16- 23	4.2	"	1.93	44	352	
	24-30	3.9	"	1.37	29	203	
May '43	1-8	3.6	"	.61	12	96	321
	9-16	3.5	"	.71	13	104	
	17-24	3.4	"	.47	9	72	
	25-31	3.4	"	.40	7	49	
June '43	1-8	3.5	"	.41	8	64	209
	9-15	3.3	"	.40	7	49	
	16-23	3.5	"	.24	5	40	
	24-30	3.9	"	.36	8	56	

MT-3

Murphys Creek

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Sol. P. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	3.1	5.41	.03	0.5	4.0	12.7
	9-16	3.6	"	.03	0.6	4.8	
	17-24	3.4	"	.02	0.4	3.2	
	25-31	2.6	"	.01	0.1	0.7	
Aug. '42	1-8	3.5	"	.01	0.2	1.6	4.7
	9-16	2.5	"	.015	0.2	1.6	
	17-24	2.5	"	.01	0.1	0.8	
	25-31	2.5	"	.01	0.1	0.7	
Sept. '42	1-8	4.2	"	.01	0.2	1.6	7.5
	9-15	4.7	"	.01	0.3	2.1	
	16-23	5.4	"	.01	0.3	2.4	
	24-30	3.8	"	.01	0.2	1.4	
Oct. '42	1-8	3.8	"	.01	0.2	1.6	5.4
	9-16	3.4	"	.01	0.2	1.6	
	17-24	2.5	"	.01	0.1	0.8	
	25-31	4.0	"	.01	0.2	1.4	
Nov. '42	1-8	5.0	"	.01	0.2	1.6	18.7
	9-15	8.2	"	.04	1.8	12.6	
	16-23	5.1	"	.01	0.3	2.4	
	24-30	4.8	"	.01	0.3	2.1	
Dec. '42	1-8	5.0	"	.01	0.2	1.6	7.6
	9-16	3.7	"	.01	0.2	1.6	
	17-24	4.1	"	.01	0.2	1.6	
	25-31	7.6	"	.01	0.4	2.8	
Jan. '43	1-8	5.9	"	.01	0.3	2.4	8.6
	9-16	5.7	"	.01	0.3	2.4	
	17-24	5.4	"	.01	0.3	2.4	
	25-31	5.1	"	.01	0.2	1.4	
Feb. '43	1-7	4.7	"	.01	0.3	2.1	10.5
	8-14	4.2	"	.01	0.2	1.4	
	15-21	5.0	"	.01	0.3	2.1	
	22-28	13.7	"	.01	0.7	4.9	
Mar. '43	1-8	7.2	"	.01	0.3	2.4	19.5
	9-16	20.0	"	.01	1.0	8.0	
	17-24	14.5	"	.01	0.7	5.6	
	25-31	9.8	"	.01	0.5	3.5	
Apr. '43	1-8	5.6	"	.01	0.3	2.4	7.6
	9-15	4.7	"	.01	0.2	1.4	
	16-23	4.2	"	.015	0.3	2.4	
	24-30	3.9	"	.01	0.2	1.4	
May '43	1-8	3.6	"	.01	0.2	1.6	6.2
	9-16	3.6	"	.01	0.2	1.6	
	17-24	3.4	"	.01	0.2	1.6	
	25-31	3.4	"	.01	0.2	1.4	
June '43	1-8	3.5	"	.01	0.2	1.6	6.0
	9-15	3.3	"	.01	0.2	1.4	
	16-23	3.5	"	.01	0.2	1.6	
	24-30	3.9	"	.01	0.2	1.4	

MT-3 122<

MURPHYS CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Vol. S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	3.1	5.41	13.0	218	1,745	6,001
	9-16	3.6	"	10.0	195	1,560	
	17-24	3.4	"	11.0	202	1,616	
	25-31	2.6	"	11.0	154	1,080	
Aug. '42	1-8	3.5	"	13.0	246	1,970	6,240
	9-16	2.5	"	16.0	216	1,730	
	17-24	2.5	"	13.5	182	1,455	
	25-31	2.5	"	11.5	155	1,085	
Sept. '42	1-8	4.2	"	7.5	170	1,360	8,250
	9-15	4.7	"	11.0	280	1,960	
	16-23	5.4	"	12.8	373	2,985	
	24-30	3.8	"	13.5	278	1,945	
Oct. '42	1-8	3.8	"	9.0	185	1,480	5,505
	9-16	3.4	"	13.5	248	1,980	
	17-24	2.5	"	10.5	142	1,135	
	25-31	4.0	"	6.0	130	910	
Nov. '42	1-8	5.0	"	6.5	176	1,410	3,698
	9-15	8.2	"	4.0	177	1,240	
	16-23	5.1	"	3.5	97	775	
	24-30	4.8	"	1.5	39	273	
Dec. '42	1-8	5.0	"	3.5	95	760	2,645
	9-16	3.7	"	4.0	80	640	
	17-24	4.1	"	2.5	55	440	
	25-31	7.6	"	2.8	115	805	
Jan. '43	1-8	5.9	"	3.0	96	768	2,687
	9-16	5.7	"	3.3	102	816	
	17-24	5.4	"	3.5	102	816	
	25-31	5.1	"	1.5	41	287	
Feb. '43	1-7	4.7	"	1.5	38	266	3,022
	8-14	4.2	"	2.5	57	399	
	15-21	5.0	"	1.5	41	287	
	22-28	13.7	"	4.0	296	2,070	
Mar. '43	1-8	7.2	"	2.5	97	775	6,110
	9-16	20.0	"	2.5	270	2,160	
	17-24	14.5	"	3.0	235	1,880	
	25-31	9.8	"	3.5	185	1,295	
Apr. '43	1-8	5.6	"	4.8	145	1,160	4,910
	9-15	4.7	"	6.0	153	1,070	
	16-23	4.2	"	8.0	182	1,455	
	24-30	3.9	"	8.3	175	1,225	
May '43	1-8	3.6	"	14.0	272	2,175	5,105
	9-16	3.5	"	5.0	95	760	
	17-24	3.4	"	7.5	138	1,100	
	25-31	3.4	"	8.3	153	1,070	
June '43	1-8	3.5	"	12.0	227	1,815	6,870
	9-15	3.3	"	19.5	347	2,430	
	16-23	3.5	"	10.5	199	1,590	
	24-30	3.9	"	7.0	148	1,035	

MT-3 123< Murphys Creek

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Org.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	3.1	5.41	1.00	17	136	481
	9-16	3.6	"	.81	16	128	
	17-24	3.4	"	.76	14	112	
	25-31	2.6	"	1.10	15	105	
Aug. '42	1-8	3.5	"	.86	16	128	397
	9-16	2.5	"	.88	12	96	
	17-24	2.5	"	.90	12	96	
	25-31	2.5	"	.83	11	77	
Sept. '42	1-8	4.2	"	.79	18	144	663
	9-15	4.7	"	.85	22	154	
	16-23	5.4	"	.98	29	232	
	24-30	3.8	"	.92	19	133	
Oct. '42	1-8	3.8	"	.85	17	136	441
	9-16	3.4	"	.73	13	104	
	17-24	2.5	"	.88	12	96	
	25-31	4.0	"	.68	15	105	
Nov. '42	1-8	5.0	"	.52	14	112	593
	9-15	8.2	"	.66	29	203	
	16-23	5.1	"	.70	19	152	
	24-30	4.8	"	.68	18	126	
Dec. '42	1-8	5.0	"	.58	16	128	578
	9-16	3.7	"	.67	13	104	
	17-24	4.1	"	.76	17	136	
	25-31	7.6	"	.72	30	210	
Jan. '43	1-8	5.9	"	.68	22	176	575
	9-16	5.7	"	.62	19	152	
	17-24	5.4	"	.55	16	128	
	25-31	5.1	"	.63	17	119	
Feb. '43	1-7	4.7	"	.65	17	119	840
	8-14	4.2	"	.66	15	105	
	15-21	5.0	"	.73	20	140	
	22-28	13.7	"	.91	68	476	
Mar. '43	1-8	7.2	"	.56	22	176	1,204
	9-16	20.0	"	.56	61	488	
	17-24	14.5	"	.55	43	344	
	25-31	9.8	"	.53	28	196	
Apr. '43	1-8	5.6	"	.70	21	168	542
	9-15	4.7	"	.66	17	119	
	16-23	4.2	"	.73	17	136	
	24-30	3.9	"	.79	17	119	
May '43	1-8	3.6	"	1.00	19	152	490
	9-16	3.5	"	.65	12	96	
	17-24	3.4	"	.97	18	144	
	25-31	3.4	"	.74	14	98	
June '43	1-8	3.5	"	.80	15	120	646
	9-15	3.3	"	1.73	31	217	
	16- 23	3.5	"	1.17	22	176	
	24-30	3.9	"	.90	19	133	

MT-4 **124<** TRUAX FIELD S.P.E.

Month	Period	Avg.Flow C.F.S. Estimated	Factor	Avg.Conc. Inorg.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8						
	9-16						
	17-24						
	25-31						
Aug. '42	1-8						
	9-16						
	17-24						
	25-51						
Sept. '42	1-8						
	9-15						
	16-23						
	24-30						
Oct. '42	1-8						4,190
	9-16						
	17-24	1.85	5.41	27.9	279	2,230	
	25-31	1.85	"	28.0	280	1,960	
Nov. '42	1-8	1.90	"	26.6	274	2,119	9,939
	9-15	1.90	"	27.5	283	1,980	
	16-23	1.90	"	34.8	358	2,860	
	24-30	1.90	"	41.5	426	2,980	
Dec. '42	1-8	1.90	"	39.7	408	3,270	11,740
	9-16	1.90	"	38.9	400	3,200	
	17-24	1.90	"	35.1	361	2,890	
	25-31	1.90	"	33.1	340	2,380	
Jan. '43	1-8	2.00	"	36.4	393	3,140	12,170
	9-16	2.00	"	36.3	392	3,140	
	17-24	2.00	"	36.3	392	3,140	
	25-31	2.00	"	36.4	393	2,750	
Feb. '43	1-7	2.00	"	40.2	435	3,050	11,410
	8-14	2.00	"	36.3	392	2,750	
	15-21	2.10	"	40.8	463	3,240	
	22-28	2.10	"	29.8	338	2,370	
Mar. '43	1-8	2.10	"	46.8	531	4,250	11,490
	9-16	2.10	"	17.7	201	1,610	
	17-24	2.10	"	36.9	419	3,350	
	25-31	2.10	"	28.7	326	2,280	
Apr. '43	1-8	2.20	"	33.7	402	3,220	13,610
	9-15	2.20	"	33.8	403	2,820	
	16-23	2.20	"	42.4	505	4,040	
	24-30	2.20	"	42.5	505	3,530	
May '43	1-8	2.20	"	36.6	436	3,480	3,480
	9-16						
	17-24						
	25-31						
June '43	1-8						
	9-15						
	16-23						
	24-30						

MT-4

TRUAX FIELD S.P.E.

Month	Period	Avg.Flow C.F.S. Estimated	Factor	Avg.Conc. Sol.P. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8						
	9-16						
	17-24						
	25-31						
Aug. '42	1-8						
	9-16						
	17-24						
	25-31						
Sept. '42	1-8						
	9-15						
	16-23						
	24-30						
Oct. '42	1-8						450
	9-16						
	17-24	1.85	5.41	2.84	28.4	227	
	25-31	1.85	"	3.19	31.9	223	
Nov. '42	1-8	1.90	"	3.74	38.5	308	1,336
	9-15	1.90	"	3.92	40.3	282	
	16-23	1.90	"	4.36	44.8	358	
	24-30	1.90	"	5.40	55.5	388	
Dec. '42	1-8	1.90	"	5.60	57.6	461	2,019
	9-16	1.90	"	7.40	76.1	608	
	17-24	1.90	"	5.60	57.5	460	
	25-31	1.90	"	6.80	70.0	490	
Jan. '43	1-8	2.00	"	6.60	71.3	570	1,958
	9-16	2.00	"	6.60	71.3	570	
	17-24	2.00	"	5.00	54.0	432	
	25-31	2.00	"	5.10	55.1	386	
Feb. '43	1-7	2.00	"	6.30	68.0	476	1,855
	8-14	2.00	"	5.30	57.3	402	
	15-21	2.10	"	5.20	59.0	413	
	22-28	2.10	"	7.10	80.6	564	
Mar. '43	1-8	2.10	"	6.70	76.0	608	2,461
	9-16	2.10	"	5.03	57.0	456	
	17-24	2.10	"	7.60	86.3	690	
	25-31	2.10	"	8.90	101.0	707	
Apr. '43	1-8	2.20	"	7.80	93.0	744	3,015
	9-15	2.20	"	7.80	93.0	651	
	16-23	2.20	"	9.10	108.0	864	
	24-30	2.20	"	9.10	108.0	756	
May '43	1-8	2.20	"	7.35	87.5	700	700
	9-16						
	17-24						
	25-31						
June '43	1-8						
	9-15						
	16-23						
	24-30						

MT-4 126< TRUAX FIELD S.P.E.

Month	Period	Avg.Flow C.F.S. Estimated	Factor	Avg.Conc. Vol.S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8						
	9-16						
	17-24						
	25-31						
Aug. '42	1-8						
	9-16						
	17-24						
	25-31						
Sept. '42	1-8						
	9-15						
	16-23						
	24-30						
Oct. '42	1-8						
	9-16						
	17-24	1.85	5.41	9.3	93	744	
	25-31	1.85	"	19.0	190	1,330	2,074
Nov. '42	1-8	1.90	"	25.3	260	2,080	
	9-15	1.90	"	17.5	180	1,260	9,180
	16-23	1.90	"	37.0	380	3,040	
	24-30	1.90	"	39.0	400	2,800	
Dec. '42	1-8	1.90	"	41.0	422	3,380	
	9-16	1.90	"	26.5	273	2,185	10,665
	17-24	1.90	"	34.0	350	2,800	
	25-31	1.90	"	32.0	329	2,300	
Jan. '43	1-8	2.00	"	44.0	475	3,800	
	9-16	2.00	"	53.0	573	4,580	14,710
	17-24	2.00	"	43.5	470	3,760	
	25-31	2.00	"	34.0	367	2,570	
Feb. '43	1-7	2.00	"	79.0	854	5,980	
	8-14	2.00	"	62.0	670	4,690	17,020
	15-21	2.10	"	50.0	567	3,970	
	22-28	2.10	"	30.0	340	2,380	
Mar. '43	1-8	2.10	"	46.5	528	4,220	
	9-16	2.10	"	22.5	255	2,040	10,449
	17-24	2.10	"	22.5	255	2,040	
	25-31	2.10	"	27.0	307	2,149	
Apr. '43	1-8	2.20	"	171.0	2,035	16,300	
	9-15	2.20	"	101.0	1,200	8,400	30,335
	16-23	2.20	"	32.0	381	3,050	
	24-30	2.20	"	31.0	369	2,585	
May '43	1-8	2.20	"	39.0	464	3,710	
	9-16						
	17-24						3,710
	25-31						
June '43	1-8						
	9-15						
	16-23						
	24-30						

MT-4 127< TRUAX FIELD S.P.E.

Month	Period	Avg.Flow C.F.S. Estimated	Factor	Avg.Conc. Org. N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42							
Aug. '42							
Sept. '42							
Oct. '42	1-8						
	9-16						
	17-24	1.85	5.41	2.8	28	224	721
	25-31	1.85	"	7.1	71	497	
Nov. '42	1-8	1.90	"	5.3	54	432	
	8-15	1.90	"	4.2	43	301	2,095
	16-23	1.90	"	9.3	95	760	
	24-30	1.90	"	8.4	86	602	
Dec. '42	1-8	1.90	"	12.3	126	1,010	
	9-16	1.90	"	8.2	84	672	2,892
	17-24	1.90	"	8.8	90	720	
	25-31	1.90	"	6.8	70	490	
Jan. '43	1-8	2.00	"	10.2	110	880	
	9-16	2.00	"	10.6	115	920	3,305
	17-24	2.00	"	9.7	105	840	
	25-31	2.00	"	8.8	95	665	
Feb. '43	1-7	2.00	"	12.4	134	938	
	8-14	2.00	"	12.6	136	952	3,677
	15-21	2.10	"	15.3	174	1,220	
	22-28	2.10	"	7.1	81	567	
Mar. '43	1-8	2.10	"	12.5	142	1,135	
	9-16	2.10	"	5.7	65	520	2,670
	17-24	2.10	"	4.3	49	392	
	25-31	2.10	"	7.9	89	623	
Apr. '43	1-8	2.20	"	11.5	137	1,095	
	9-15	2.20	"	8.9	106	742	2,935
	16-23	2.20	"	6.4	76	608	
	24-30	2.20	"	5.9	70	490	
May '43	1-8	2.20	"	5.4	64	512	
	9-16						
	17-24						512
	25-31						
June '43	1-8						
	9-15						
	16-23						
	24-30						

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YAHARA RIVER AT OUTLET OF MONONA

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Inorg. N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	62.8	5.41	.16	54	432	1,554
	9-16	59.9	"	.19	62	496	
	17-24	68.3	"	.14	52	416	
	25-31	56.2	"	.10	30	210	
Aug. '42	1-8	57.1	"	.08	25	200	816
	9-16	48.4	"	.09	24	192	
	17-24	55.8	"	.06	18	144	
	25-31	56.9	"	.13	40	280	
Sept. '42	1-8	68.1	"	.10	37	296	1,738
	9-15	66.7	"	.08	29	203	
	16-23	70.8	"	.11	42	336	
	24-30	68.0	"	.35	129	903	
Oct. '42	1-8	63.5	"	.40	137	1,090	2,771
	9-16	64.2	"	.20	70	560	
	17-24	58.4	"	.18	57	456	
	25-31	53.5	"	.33	95	665	
Nov. '42	1-8	87.9	"	.42	200	1,600	7,860
	9-15	121.5	"	.45	296	2,070	
	16-23	111.1	"	.41	246	1,970	
	24-30	106.7	"	.55	317	2,220	
Dec. '42	1-8	111.1	"	.60	360	2,880	10,080
	9-16	105.9	"	.55	315	2,520	
	17-24	91.3	"	.58	286	2,290	
	25-31	103.8	"	.61	342	2,390	
Jan. '43	1-8	102.4	"	.74	410	3,280	13,056
	9-16	101.8	"	.60	330	2,640	
	17-24	99.1	"	.63	337	2,696	
	25-31	146.5	"	.80	634	4,440	
Feb. '43	1-7	155.2	"	.83	697	4,880	18,650
	8-14	137.7	"	.88	655	4,580	
	15-21	137.7	"	.84	624	4,370	
	22-28	153.4	"	.83	689	4,820	
Mar. '43	1-8	138.5	"	.78	585	4,680	33,600
	9-16	199.5	"	.91	981	7,850	
	17-24	338.4	"	.80	1,465	11,700	
	25-31	321.4	"	.77	1,338	9,370	
Apr. '43	1-8	346.5	"	.85	1,590	12,720	30,830
	9-15	293.2	"	.79	1,250	8,750	
	16-23	266.0	"	.41	590	4,720	
	24-30	245.8	"	.50	663	4,640	
May '43	1-8	125.0	"	.30	203	1,625	6,670
	9-16	82.1	"	.40	178	1,425	
	17-24	95.6	"	.46	238	1,900	
	25-31	96.9	"	.47	246	1,720	
June '43	1-8	106	"	.26	149	1,190	3,725
	9-15	101	"	.18	98	685	
	16-23	98	"	.32	170	1,360	
	24-30	117	"	.11	70	490	

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Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Sol.P. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	62.8	5.41	.06	20.4	163	461
	9-16	59.9	"	.05	16.2	130	
	17-24	68.3	"	.05	18.4	147	
	25-31	56.2	"	.01	3.0	21	
Aug. '42	1-8	57.1	"	.01	3.0	24	85
	9-16	48.4	"	.01	2.0	16	
	17-24	55.8	"	.01	3.0	24	
	25-31	56.9	"	.01	3.0	21	
Sept. '42	1-8	68.1	"	.01	3.0	24	178
	9-15	66.7	"	.01	3.0	21	
	16-23	70.8	"	.01	3.8	30	
	24-30	68.0	"	.04	14.7	103	
Oct. '42	1-8	63.5	"	.05	17.2	138	297
	9-16	64.2	"	.01	3.5	28	
	17-24	58.4	"	.02	6.3	50	
	25-31	53.5	"	.04	11.6	81	
Nov. '42	1-8	87.9	"	.055	26.2	210	809
	9-15	121.5	"	.055	36.1	253	
	16-23	111.1	"	.03	18.0	144	
	24-30	106.7	"	.05	28.8	202	
Dec. '42	1-8	111.1	"	.05	30.0	240	824
	9-16	105.9	"	.05	28.6	229	
	17-24	91.3	"	.05	24.7	198	
	25-31	103.8	"	.04	22.4	157	
Jan. '43	1-8	102.4	"	.05	27.7	222	961
	9-16	101.8	"	.05	27.5	220	
	17-24	99.1	"	.05	26.8	214	
	25-31	146.5	"	.055	43.6	305	
Feb. '43	1-7	155.2	"	.06	50.4	353	1,378
	8-14	137.7	"	.06	44.6	312	
	15-21	137.7	"	.07	52.1	364	
	22-28	153.4	"	.06	49.8	349	
Mar. '43	1-8	138.5	"	.05	37.5	300	2,032
	9-16	199.5	"	.07	75.5	604	
	17-24	338.4	"	.07	128.0	1,025	
	25-31	321.4	"	.08	139.0	973	
Apr. '43	1-8	346.5	"	.10	187.0	1,495	2,032
	9-15	293.2	"	.03	47.5	332	
	16-23	266.0	"	.01	14.0	112	
	24-30	245.8	"	.01	13.3	93	
May '43	1-8	125.0	"	.02	13.5	108	532
	9-16	82.1	"	.02	9.0	72	
	17-24	95.6	"	.05	25.8	206	
	25-31	96.9	"	.04	20.9	146	
June '43	1-8	106	"	.025	14.3	114	343
	9-15	101	"	.015	8.2	57	
	16-23	98	"	.03	15.9	127	
	24-30	117	"	.01	6.4	45	

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YAHARA RIVER AT OUTLET OF MONONA

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Vol. S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	62.8	5.41	12.0	4,070	32,600	77,080
	9-16	59.9	"	4.8	1,550	12,400	
	17-24	68.3	"	6.0	2,210	17,680	
	25-31	56.2	"	6.8	2,060	14,400	
Aug. '42	1-8	57.1	"	10.0	3,090	24,700	101,740
	9-16	48.4	"	12.3	3,220	25,760	
	17-24	55.8	"	10.8	3,260	26,080	
	25-31	56.9	"	11.7	3,600	25,200	
Sept. '42	1-8	68.1	"	8.3	3,050	24,400	77,020
	9-15	66.7	"	8.5	3,060	21,400	
	16-23	70.8	"	6.0	2,290	18,320	
	24-30	68.0	"	5.0	1,840	12,900	
Oct. '42	1-8	63.5	"	4.5	1,540	12,320	60,010
	9-16	64.2	"	6.0	2,080	16,640	
	17-24	58.4	"	7.5	2,370	18,900	
	25-31	53.5	"	6.0	1,735	12,150	
Nov. '42	1-8	87.9	"	5.5	2,620	20,950	72,800
	9-15	121.5	"	5.0	3,280	22,950	
	16-23	111.1	"	3.5	2,100	16,800	
	24-30	106.7	"	3.0	1,730	12,100	
Dec. '42	1-8	111.1	"	0.5	300	2,400	30,990
	9-16	105.9	"	3.0	1,715	13,600	
	17-24	91.3	"	2.0	990	7,920	
	25-31	103.8	"	1.8	1,010	7,070	
Jan. '43	1-8	102.4	"	1.5	830	6,640	28,650
	9-16	101.8	"	1.8	990	7,920	
	17-24	99.1	"	2.0	1,070	8,560	
	25-31	146.5	"	1.0	790	5,530	
Feb. '43	1-7	155.2	"	1.5	1,260	8,820	29,390
	8-14	137.7	"	1.0	744	5,210	
	15-21	137.7	"	1.5	1,115	7,800	
	22-28	153.4	"	1.3	1,080	7,560	
Mar. '43	1-8	138.5	"	1.0	750	6,000	74,170
	9-16	199.5	"	1.0	1,078	8,620	
	17-24	338.4	"	2.0	3,660	29,300	
	25-31	321.4	"	2.5	4,350	30,250	
Apr. '43	1-8	346.5	"	1.0	1,870	14,950	261,200
	9-15	293.2	"	3.0	4,750	33,250	
	16-23	266.0	"	8.0	11,500	92,000	
	24-30	245.8	"	13.0	17,250	121,000	
May '43	1-8	125.0	"	6.3	4,260	34,100	98,200
	9-16	82.1	"	5.5	2,440	19,500	
	17-24	95.6	"	6.8	3,510	28,100	
	25-31	96.9	"	4.5	2,360	16,500	
June '43	1-8	106	"	5.0	2,865	22,900	81,450
	9-15	101	"	4.5	2,460	17,200	
	16-23	98	"	3.5	1,855	14,850	
	24-30	117	"	6.0	3,790	26,500	

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YAHARA RIVER AT OUTLET OF MONONA

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Org.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
	1-8	62.8	5.41	.80	272	2,175	
July '42	9-16	59.9	"	.86	279	2,230	7,555
	17-24	68.3	"	.63	232	1,855	
	25-31	56.2	"	.61	185	1,295	
	1-8	57.1	"	.60	185	1,480	
Aug. '42	9-16	48.4	"	.75	196	1,570	6,395
	17-24	55.8	"	.83	251	2,010	
	25-31	56.9	"	.62	191	1,335	
	1-8	68.1	"	.59	217	1,735	
Sept. '42	9-15	66.7	"	.67	242	1,695	6,644
	16-23	70.8	"	.59	225	1,800	
	24-30	68.0	"	.55	202	1,414	
	1-8	63.5	"	.52	179	1,430	
Oct. '42	9-16	64.2	"	.71	247	1,975	7,005
	17-24	58.4	"	1.00	316	2,530	
	25-31	53.5	"	.53	154	1,070	
	1-8	87.9	"	.50	238	1,905	
Nov. '42	9-15	121.5	"	.50	328	2,295	9,040
	16-23	111.1	"	.57	343	2,740	
	24-30	106.7	"	.52	300	2,100	
	1-8	111.1	"	.45	270	2,160	
Dec. '42	9-16	105.9	"	.41	235	1,880	7,700
	17-24	91.3	"	.45	222	1,780	
	25-31	103.8	"	.48	269	1,880	
	1-8	102.4	"	.49	271	2,170	
Jan. '43	9-16	101.8	"	.44	242	1,935	8,815
	17-24	99.1	"	.39	209	1,670	
	25-31	146.5	"	.55	435	3,040	
	1-7	155	"	.50	419	2,930	
Feb. '43	8-14	138	"	.54	402	2,810	11,240
	15-21	138	"	.53	397	2,780	
	22-28	153	"	.47	389	2,720	
	1-8	138	"	.49	365	2,920	
Mar. '43	9-16	199	"	.52	560	4,480	23,200
	17-24	338	"	.64	1,170	9,360	
	25-31	321	"	.53	920	6,440	
	1-8	347	"	.45	845	6,760	
Apr. '43	9-15	293	"	.52	824	5,760	31,770
	16-23	266	"	.96	1,380	11,050	
	24-30	246	"	.88	1,170	8,200	
	1-8	125	"	.84	567	4,540	
May '43	9-16	82	"	.59	262	2,100	13,130
	17-24	96	"	.98	509	4,070	
	25-31	97	"	.66	346	2,420	
	1-8	106	"	.70	401	3,208	
June '43	9-15	101	"	.75	409	2,865	11,293
	16-23	98	"	.52	276	2,210	
	24-30	117	"	.68	430	3,010	

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NINE SPRINGS CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Inorg.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	5.7	5.41	.99	30	240	788
	9-16	6.1	"	.59	19	152	
	17-24	6.3	"	1.16	39	312	
	25-31	4.7	"	.46	12	84	
Aug. '42	1-8	5.0	"	.56	15	120	388
	9-16	3.8	"	.55	11	88	
	17-24	3.7	"	.59	12	96	
	25-31	3.6	"	.63	12	84	
Sept. '42	1-8	5.6	"	.63	19	152	1,226
	9-15	6.7	"	1.27	46	322	
	16-23	8.5	"	1.27	59	472	
	24-30	5.9	"	1.24	40	280	
Oct. '42	1-8	6.4	"	1.21	42	336	2,346
	9-16	6.9	"	1.51	56	448	
	17-24	6.3	"	1.57	54	442	
	25-31	9.0	"	3.50	160	1,120	
Nov. '42	1-8	8.8	"	2.33	111	888	7,503
	9-15	14.5	"	7.50	590	4,130	
	16-23	9.3	"	3.92	197	1,575	
	24-30	9.9	"	2.43	130	910	
Dec. '42	1-8	10.0	"	2.93	158	1,262	4,772
	9-16	8.9	"	2.62	126	1,010	
	17-24	9.6	"	2.43	126	1,010	
	25-31	13.5	"	2.78	213	1,490	
Jan. '43	1-8	11.6	"	3.12	196	1,570	5,599
	9-16	13.0	"	2.98	203	1,625	
	17-24	10.3	"	2.85	159	1,270	
	25-31	11.0	"	2.73	162	1,134	
Feb. '43	1-7	10.4	"	2.81	158	1,106	7,626
	8-14	9.4	"	2.56	130	910	
	15-21	15.4	"	2.59	216	1,510	
	22-28	26.0	"	4.17	586	4,100	
Mar. '43	1-8	14.5	"	3.42	269	2,150	16,190
	9-16	50.4	"	3.60	980	7,840	
	17-24	28.6	"	3.60	556	4,450	
	25-31	15.4	"	3.00	250	1,750	
Apr. '43	1-8	8.8	"	2.92	139	1,110	3,398
	9-15	10.2	"	2.20	121	847	
	16-23	9.6	"	2.00	104	832	
	24-30	8.1	"	1.99	87	609	
May '43	1-8	7.0	"	2.39	91	728	2,862
	9-16	6.6	"	2.25	81	648	
	17-24	8.0	"	2.16	93	744	
	25-31	8.9	"	2.21	106	742	
June '43	1-8	9.3	"	1.91	96	768	2,730
	9-15	9.2	"	2.09	104	728	
	16-23	9.0	"	1.63	79	632	
	24-30	10.3	"	1.54	86	602	

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NINE SPRINGS CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Sol.P. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	5.7	5.41	.17	5.24	42	224
	9-16	6.1	"	.21	6.94	56	
	17-24	6.3	"	.32	10.90	87	
	25-31	4.7	"	.22	5.60	39	
Aug. '42	1-8	5.0	"	.16	4.32	35	104
	9-16	3.8	"	.14	2.80	22	
	17-24	3.7	"	.10	2.00	16	
	25-31	3.6	"	.23	4.50	31	
Sept. '42	1-8	5.6	"	.18	5.45	44	176
	9-15	6.7	"	.19	6.90	48	
	16-23	8.5	"	.13	5.98	48	
	24-30	5.9	"	.16	5.21	36	
Oct. '42	1-8	6.4	"	.10	3.45	28	117
	9-16	6.9	"	.17	6.35	51	
	17-24	6.3	"	.09	3.06	24	
	25-31	9.0	"	.04	1.95	14	
Nov. '42	1-8	8.8	"	.05	2.38	19	68
	9-15	14.5	"	.04	3.14	22	
	16-23	9.3	"	.05	2.51	20	
	24-30	9.9	"	.02	1.07	7	
Dec. '42	1-8	10.0	"	.04	2.16	17	63
	9-16	8.9	"	.03	1.44	12	
	17-24	9.6	"	.05	2.60	21	
	25-31	13.5	"	.025	1,83	13	
Jan. '43	1-8	11.6	"	.025	1.57	13	66
	9-16	13.0	"	.025	1.76	14	
	17-24	10.3	"	.050	2.79	22	
	25-31	11.0	"	.040	2.38	17	
Feb. '43	1-7	10.4	"	.05	2.82	20	152
	8-14	9.4	"	.045	2.29	16	
	15-21	15.4	"	.08	6.66	47	
	22-28	26.0	"	.07	9.84	69	
Mar. '43	1-8	14.5	"	.06	4.72	38	719
	9-16	50.4	"	.24	65.40	523	
	17-24	28.6	"	.10	15.45	123	
	25-31	15.4	"	.06	5.00	35	
Apr. '43	1-8	8.8	"	.13	6.18	49	166
	9-15	10.2	"	.11	6.06	42	
	16-23	9.6	"	.12	6.22	50	
	24-30	8.1	"	.08	3.50	25	
May '43	1-8	7.0	"	.14	5.30	42	159
	9-16	6.6	"	.11	3.92	31	
	17-24	8.0	"	.12	5.20	42	
	25-31	8.9	"	.13	6.25	44	
June '43	1-8	9.3	"	.13	6.50	52	251
	9-15	9.2	"	.11	5.50	39	
	16-23	9.0	"	.25	12.20	98	
	24-30	10.3	"	.16	8.90	62	

YT-1 NINE SPRINGS CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc Vol.S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per month
July '42	1-8	5.7	5.41	5.5	169	1,350	6,285
	9-16	6.1	"	5.5	182	1,455	
	17-24	6.3	"	4.3	146	1,170	
	25-31	4.7	"	13.5	330	2,310	
Aug. '42	1-8	5.0	"	4.0	108	864	7,639
	9-16	3.8	"	29.5	590	4,720	
	17-24	3.7	"	9.0	180	1,440	
	25-31	3.6	"	4.5	88	615	
Sept. '42	1-8	5.6	"	6.5	197	1,575	8,135
	9-15	6.7	"	8.0	290	2,030	
	16-23	8.5	"	10.5	483	3,860	
	24-30	5.9	"	3.0	96	670	
Oct. '42	1-8	6.4	"	2.5	86	690	6,956
	9-16	6.9	"	14.5	541	4,330	
	17-24	6.3	"	3.0	102	816	
	25-31	9.0	"	3.5	160	1,120	
Nov. '42	1-8	8.8	"	3.0	142	1,135	5,435
	9-15	14.5	"	1.5	118	825	
	16-23	9.3	"	3.5	176	1,410	
	24-30	9.9	"	5.5	295	2,065	
Dec. '42	1-8	10.0	"	4.0	216	1,730	7,785
	9-16	8.9	"	1.0	48	385	
	17-24	9.6	"	6.5	338	2,700	
	25-31	13.5	"	5.8	424	2,970	
Jan. '43	1-8	11.6	"	5.0	314	2,510	7,430
	9-16	13.0	"	3.8	267	2,135	
	17-24	10.3	"	2.5	140	1,120	
	25-31	11.0	"	4.0	238	1,665	
Feb. '43	1-7	10.4	"	4.5	254	1,780	14,685
	8-14	9.4	"	4.0	204	1,430	
	15-21	15.4	"	4.5	375	2,625	
	22-28	26.0	"	9.0	1,265	8,850	
Mar. '43	1-8	14.5	"	2.0	157	1,255	61,005
	9-16	50.4	"	12.0	3,270	26,150	
	17-24	28.6	"	22.0	3,400	27,200	
	25-31	15.4	"	11.0	915	6,400	
Apr. '43	1-8	8.8	"	3.5	166	1,330	12,450
	9-15	10.2	"	6.5	358	2,500	
	16-23	9.6	"	13.0	675	5,400	
	24-30	8.1	"	10.5	460	3,220	
May '43	1-8	7.0	"	30.0	1,135	9,080	94,480
	9-16	6.6	"	226.0	8,080	64,600	
	17-24	8.0	"	47.0	2,030	16,250	
	25-31	8.9	"	13.5	650	4,550	
June '43	1-8	9.3	"	7.0	352	2,820	10,720
	9-15	9.2	"	6.0	323	2,260	
	16-23	9.0	"	9.0	438	3,500	
	24-30	10.3	"	5.5	306	2,140	

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NINE SPRINGS CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Org.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	5.7	5.41	.56	17	136	529
	9-16	6.1	"	.64	21	168	
	17-24	6.3	"	.45	15	120	
	25-31	4.7	"	.58	15	105	
Aug. '42	1-8	5.0	"	.32	9	72	250
	9-16	3.8	"	.53	11	88	
	17-24	3.7	"	.28	6	48	
	25-31	3.6	"	.29	6	42	
Sept. '42	1-8	5.6	"	.36	11	88	497
	9-15	6.7	"	.44	16	112	
	16-23	8.5	"	.52	24	192	
	24-30	5.9	"	.46	15	105	
Oct. '42	1-8	6.4	"	.39	13	104	485
	9-16	6.9	"	.59	22	176	
	16-24	6.3	"	.26	9	72	
	25-31	9.0	"	.40	19	133	
Nov. '42	1-8	8.8	"	.36	17	136	916
	9-15	14.5	"	.78	61	427	
	16-23	9.3	"	.47	24	192	
	24-30	9.9	"	.43	23	161	
Dec. '42	1-8	10.0	"	.45	24	192	773
	9-16	8.9	"	.37	18	144	
	17-24	9.6	"	.46	24	192	
	25-31	13.5	"	.48	35	245	
Jan. '43	1-8	11.6	"	.49	31	248	846
	9-16	13.0	"	.44	31	248	
	17-24	10.3	"	.38	21	168	
	25-31	11.0	"	.43	26	182	
Feb. '43	1-7	10.4	"	.48	26	182	2,220
	8-14	9.4	"	.38	19	133	
	15-21	15.4	"	.48	40	280	
	22-28	26.0	"	1.65	232	1,625	
Mar. '43	1-8	14.5	"	.43	34	272	7,438
	9-16	50.4	"	1.72	468	3,750	
	17-24	28.6	"	2.15	332	2,660	
	25-31	15.4	"	1.30	108	756	
Apr. '43	1-8	8.8	"	.60	29	232	1,135
	9-15	10.2	"	.60	33	231	
	16-23	9.6	"	.81	42	336	
	24-30	8.1	"	1.10	48	336	
May '43	1-8	7.0	"	1.35	51	408	2,318
	9-16	6.6	"	3.42	122	976	
	17-24	8.0	"	1.85	80	640	
	25-31	8.9	"	.88	42	294	
June '43	1-8	9.3	"	.78	39	312	887
	9-15	9.2	"	.53	26	182	
	16-23	9.0	"	.59	29	232	
	24-30	10.3	"	.42	23	161	

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MADISON SEWAGE PLANT EFFLUENT

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Inorg.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	18.5	5.41	19.6	1,960	15,680	60,160
	9-16	19.9	"	19.4	2,085	16,680	
	17-24	20.6	"	15.7	1,750	14,000	
	25-31	20.0	"	18.3	1,975	13,800	
Aug. '42	1-8	20.3	"	16.7	1,830	14,630	47,620
	9-16	19.0	"	16.2	1,665	13,320	
	17-24	19.2	"	13.3	1,380	11,050	
	25-31	19.4	"	11.7	1,230	8,620	
Sept. '42	1-8	19.3	"	12.2	1,270	10,150	50,130
	9-15	20.5	"	11.9	1,320	9,250	
	16-23	21.2	"	18.8	2,150	17,200	
	25-30	20.7	"	16.5	1,935	13,530	
Oct. '42	1-8	20.6	"	17.5	1,950	15,600	62,420
	9-16	20.3	"	17.7	1,945	15,570	
	17-24	18.7	"	19.5	1,975	15,800	
	25-31	19.0	"	21.5	2,205	15,450	
Nov. '42	1-8	19.2	"	21.0	2,180	17,450	64,930
	9-15	20.3	"	21.6	2,370	16,580	
	16-23	19.6	"	20.4	2,160	17,300	
	24-30	19.0	"	18.9	1,940	13,600	
Dec. '42	1-8	19.6	"	19.6	2,075	16,600	62,390
	9-16	19.4	"	19.0	1,990	15,920	
	17-24	18.9	"	17.5	1,790	14,320	
	25-31	18.7	"	22.0	2,225	15,550	
Jan. '43	1-8	18.4	"	17.8	1,780	14,240	50,290
	9-16	18.6	"	16.7	1,680	13,450	
	17-24	18.1	"	15.6	1,530	12,250	
	25-31	18.9	"	14.5	1,480	10,350	
Feb. '43	1-7	18.1	"	18.4	1,800	12,600	49,880
	8-14	18.1	"	15.3	1,500	10,500	
	15-21	19.1	"	20.3	2,095	14,680	
	22-28	20.5	"	15.6	1,730	12,100	
Mar. '43	1-8	18.9	"	16.4	1,675	13,400	54,350
	9-16	19.7	"	15.3	1,625	13,000	
	17-24	21.2	"	16.4	1,875	15,000	
	25-31	21.0	"	16.3	1,850	12,950	
Apr. '43	1-8	20.2	"	13.2	1,440	11,520	45,490
	9-15	18.4	"	13.5	1,350	9,450	
	16-23	20.2	"	13.2	1,440	11,520	
	24-30	20.3	"	16.9	1,855	13,000	
May '43	1-8	19.6	"	15.4	1,630	13,020	49,450
	9-16	19.3	"	15.3	1,595	12,750	
	17-24	19.8	"	15.2	1,600	12,800	
	25-31	19.3	"	14.9	1,555	10,880	
June '43	1-8	20.5	"	19.6	2,170	17,360	62,900
	9-15	19.6	"	18.5	1,960	13,720	
	16-23	19.7	"	19.9	2,115	16,920	
	24-30	20.9	"	18.8	2,125	14,900	

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MADISON SEWAGE PLANT EFFLUENT

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Sol.P. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
	1-8	18.5	5.41	3.2	320	2,560	
July '42	9-16	19.9	"	3.0	316	2,528	
	17-24	20.6	"	3.0	334	2,670	9,193
	25-31	20.0	"	1.9	205	1,435	
	1-8	20.3	"	3.08	338	2,700	
Aug. '42	9-16	19.0	"	3.08	316	2,528	
	17-24	19.2	"	2.44	253	2,024	9,102
	25-30	19.4	"	2.52	264	1,850	
	1-8	19.3	"	2.60	271	2,168	
Sept. '42	9-15	20.5	"	2.08	230	1,610	
	16-23	21.2	"	2.28	261	2,088	7,666
	24-30	20.7	"	2.30	257	1,800	
	1-8	20.6	"	2.20	245	1,960	
Oct. '42	9-16	20.3	"	2.52	276	2,208	
	17-24	18.7	"	2.84	287	2,296	8,361
	25-30	19.0	"	2.64	271	1,897	
	1-8	19.2	"	3.0	311	2,488	
Nov. '42	9-15	20.3	"	3.00	329	2,300	
	16-23	19.6	"	2.72	288	2,304	8,877
	24-30	19.0	"	2.48	255	1,785	
	1-8	19.6	"	2.88	306	2,448	
Dec. '42	9-16	19.4	"	2.76	290	2,320	
	17-24	18.9	"	2.96	303	2,424	9,282
	25-31	18.7	"	2.96	299	2,090	
	1-8	18.4	"	2.40	239	1,912	
Jan. '43	9-16	18.6	"	2.40	242	1,936	
	17-24	18.1	"	2.44	239	1,912	7,270
	25-31	18.9	"	2.12	216	1,510	
	1-7	18.1	"	3.08	302	2,114	
Feb. '43	8-14	18.1	"	3.12	305	2,135	
	15-21	19.1	"	3.12	322	2,250	8,079
	22-28	20.5	"	2.04	226	1,580	
	1-8	18.9	"	2.72	278	2,224	
Mar. '43	9-16	19.7	"	2.12	226	1,808	
	17-24	21.2	"	2.12	243	1,944	9.626
	25-31	21.0	"	4.60	522	3,650	
	1-8	20.2	"	3.32	362	2,896	
Apr. '43	9-15	18.4	"	3.32	330	2,310	
	16-23	20.2	"	3.52	384	3,072	10,338
	24-30	20.3	"	2.68	294	2,060	
	1-8	19.6	"	3.56	377	3,006	
May '43	9-16	19.3	"	4.20	438	3,500	
	17-24	19.8	"	4.00	428	3,420	12,346
	25-31	19.3	"	3.32	346	2,420	
	1-8	20.5	"	3.92	435	3,480	
June '43	9-15	19.6	"	3.52	373	2,610	
	16-23	19.7	"	3.44	366	2,930	11,650
	24-30	20.9	"	3.32	376	2,630	

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MADISON SEWAGE PLANT EFFLUENT

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Vol.S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	18.5	5.41	12.5	1,250	10,000	46,350
	9-16	19.9	"	19.0	2,000	16,000	
	17-24	20.6	"	12.2	1,360	10,900	
	25-31	20.0	"	12.5	1,350	9,450	
Aug. '42	1-8	20.3	"	11.0	1,210	9,680	41,090
	9-16	19.0	"	11.0	1,130	9,040	
	17-24	19.2	"	17.0	1,765	14,150	
	25-31	19.4	"	11.2	1,175	8,220	
Sept. '42	1-8	19.3	"	12.3	1,280	10,250	40,570
	9-15	20.5	"	13.0	1,440	10,100	
	16-23	21.2	"	14.3	1,640	13,150	
	24-30	20.7	"	9.0	1,010	7,070	
Oct. '42	1-8	20.6	"	8.8	980	7,850	62,100
	9-16	20.3	"	34.0	3,740	29,900	
	17-24	18.7	"	17.5	1,770	14,150	
	25-31	19.0	"	14.0	1,440	10,100	
Nov. '42	1-8	19.2	"	14.5	1,505	12,050	42,450
	9-15	20.3	"	15.5	1,700	11,900	
	16-23	19.6	"	12.5	1,325	10,600	
	24-30	19.0	"	11.0	1,130	7,900	
Dec. '42	1-8	19.6	"	18.0	1,905	15,250	54,100
	9-16	19.4	"	12.5	1,310	10,500	
	17-24	18.9	"	18.0	1,840	14,700	
	25-31	18.7	"	19.3	1,950	13,650	
Jan. '43	1-8	18.4	"	20.5	2,040	16,300	59,250
	9-16	18.6	"	19.8	1,890	15,900	
	17-24	18.1	"	19.0	1,860	14,900	
	25-31	18.9	"	17.0	1,735	12,150	
Feb. '43	1-7	18.1	"	18.0	1,760	12,300	55,100
	8-14	18.1	"	21.0	2,060	14,400	
	15-21	19.1	"	21.0	2,170	15,200	
	22-28	20.5	"	17.0	1,885	13,200	
Mar. '43	1-8	18.9	"	19.5	1,990	15,900	67,450
	9-16	19.7	"	21.0	2,240	17,900	
	17-24	21.2	"	21.0	2,410	19,300	
	25-31	21.0	"	18.0	2,050	14,350	
Apr. '43	1-8	20.2	"	16.3	1,780	14,250	43,685
	9-15	18.4	"	14.5	1,440	10,100	
	16-23	20.2	"	12.5	1,365	10,900	
	24-30	20.3	"	11.0	1,205	8,435	
May '43	1-8	19.6	"	21.0	2,220	17,760	47,510
	9-16	19.3	"	11.0	1,150	9,200	
	17-24	19.8	"	15.5	1,660	12,500	
	25-31	19.3	"	11.0	1,150	8,050	
June '43	1-8	20.5	"	14.0	1,500	12,000	33,780
	9-15	19.6	"	13.0	1,375	9,620	
	16-23	19.7	"	4.5	480	3,840	
	24-30	20.9	"	10.5	1,190	8,320	

MADISON SEWAGE PLANT EFFLUENT

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Org.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
	1-8	18.5	5.41	3.50	350	2,800	
July '42	9-16	19.9	"	4.00	430	3,440	
	17-24	20.6	"	3.00	334	2,670	11,110
	25-31	20.0	"	2.90	314	2,200	
	1-8	20.3	"	2.67	293	2,345	
Aug. '42	9-16	19.0	"	2.67	274	2,190	
	17-24	19.2	"	2.79	289	2,310	8,810
	25-31	19.4	"	2.68	281	1,965	
	1-8	19.3	"	2.60	271	2,170	
Sept. '42	9-15	20.5	"	2.45	271	1,895	
	16-23	21.2	"	2.78	319	2,550	8,335
	24-30	20.7	"	2.20	246	1,720	
	1-8	20.6	"	2.42	270	2,160	
Oct. '42	9-16	20.3	"	2.33	256	2,050	
	17-24	18.7	"	1.50	152	1,215	6,650
	25-30	19.0	"	1.70	175	1,225	
	1-8	19.2	"	1.70	176	1,410	
Nov. '42	9-15	20.3	"	1.85	203	1,421	
	16-23	19.6	"	1.40	148	1,185	4,913
	24-30	19.0	"	1.25	128	897	
	1-8	19.6	"	2.15	228	1,825	
Dec. '42	9-16	19.4	"	1.25	131	1,050	
	17-24	18.9	"	2.30	235	1,880	6,100
	25-31	18.7	"	1.90	192	1,345	
	1-8	18.4	"	1.50	150	1,200	
Jan. '43	9-16	18.6	"	1.70	170	1,360	
	17-24	18.1	"	1.90	186	1,485	5,265
	25-31	18.9	"	1.70	174	1,220	
	1-7	18.1	"	1.50	147	1,030	
Feb. '43	8-14	18.1	"	1.60	157	1,100	
	15-21	19.1	"	1.70	176	1,230	4,335
	22-28	20.5	"	1.25	139	975	
	1-8	18.9	"	1.70	174	1,390	
Mar. '43	9-16	19.7	"	1.83	195	1,560	
	17-24	21.2	"	1.96	225	1,800	6,220
	25-31	21.0	"	1.85	210	1,470	
	1-8	20.2	"	1.60	175	1,400	
Apr. '43	9-15	18.4	"	1.35	135	945	
	16-23	20.2	"	1.56	170	1,360	5,015
	24-30	20.3	"	1.70	187	1,310	
	1-8	19.6	"	1.72	182	1,455	
May '43	9-16	19.3	"	1.52	159	1,270	
	17-24	19.8	"	1.34	143	1,145	5,040
	25-31	19.3	"	1.60	167	1,170	
	1-8	20.5	"	1.70	188	1,505	
June '43	9-15	19.6	"	1.74	185	1,295	
	16-23	19.7	"	.72	77	616	4,416
	24-30	20.9	"	1.27	143	1,000	

WT-2 CLEMENS CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Inorg.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.9	5.41	1.35	6.6	53	215
	9-16	1.2	"	1.35	8.8	70	
	17-24	0.9	"	1.35	6.6	53	
	25-31	0.6	"	1.74	5.6	39	
Aug. '42	1-8	1.5	"	1.11	9.0	72	137
	9-16	0.7	"	.90	3.4	27	
	17-24	0.5	"	.88	2.4	19	
	25-31	0.5	"	.98	2.7	19	
Sept. '42	1-8	1.4	"	.33	2.5	20	55
	9-15	1.9	"	.26	2.7	19	
	16-23	1.5	"	.19	1.5	12	
	24-30	0.2	"	.57	0.6	4	
Oct. '42	1-8	0.9	"	.29	1.4	11	128
	9-16	0.6	"	.90	2.9	23	
	17-24	0.5	"	1.29	3.5	28	
	25-31	1.3	"	1.35	9.5	66	
Nov. '42	1-8	0.9	"	1.66	8.1	65	201
	9-15	1.4	"	.30	2.3	16	
	16-23	1.0	"	1.24	6.7	54	
	24-30	0.9	"	1.93	9.4	66	
Dec. '42	1-8	0.7	"	2.43	9.2	74	310
	9-16	0.6	"	1.92	6.2	50	
	17-24	0.5	"	2.18	5.9	47	
	25-31	1.8	"	2.05	19.9	139	
Jan. '43	1-8	1.0	"	1.91	10.3	82	287
	9-16	0.7	"	2.50	9.5	76	
	17-24	0.7	"	2.46	9.3	74	
	25-31	0.6	"	2.42	7.9	55	
Feb. '43	1-7	0.6	"	2.49	8.1	57	1,176
	8-14	0.9	"	2.10	10.2	71	
	15-21	1.8	"	2.75	26.7	187	
	22-28	8.4	"	2.72	123.0	861	
Mar. '43	1-8	3.3	"	2.68	47.7	382	3,107
	9-16	14.6	"	2.45	193.5	1,550	
	17-24	9.7	"	2.22	116.0	930	
	25-31	4.9	"	1.32	35.0	245	
Apr. '43	1-8	2.4	"	1.87	24.2	193	492
	9-15	1.8	"	1.74	17.0	119	
	16-23	1.5	"	1.67	13.5	108	
	24-30	1.2	"	1.59	10.3	72	
May '43	1-8	0.9	"	1.80	8.7	70	236
	9-16	0.8	"	1.92	8.3	66	
	17-24	1.0	"	1.72	9.3	74	
	25-31	0.9	"	.77	3.7	26	
June '43	1-8	1.5	"	.91	7.4	59	388
	9-15	1.0	"	2.14	11.6	81	
	16-23	1.0	"	2.18	11.8	93	
	24-30	1.9	"	2.15	22.1	155	

WT-2

CLEMANS CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc Sol.P. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.9	5.41	.16	.78	6.2	18.7
	9-16	1.2	"	.16	1.04	8.3	
	17-24	0.9	"	.07	.33	2.6	
	25-31	0.6	"	.07	.23	1.6	
Aug. '42	1-8	1.5	"	.10	.81	6.5	11.1
	9-16	0.7	"	.07	.27	2.2	
	17-24	0.5	"	.05	.14	1.1	
	25-31	0.5	"	.07	.19	1.3	
Sept. '42	1-8	1.4	"	.20	1.51	12.1	34.8
	9-15	1.9	"	.19	1.95	13.6	
	16-23	1.5	"	.14	1.10	8.8	
	24-30	0.2	"	.04	.04	0.3	
Oct. '42	1-8	0.9	"	.06	.29	2.3	7.1
	9-16	0.6	"	.04	.13	1.0	
	17-24	0.5	"	.04	.11	0.9	
	25-31	1.3	"	.06	.42	2.9	
Nov. '42	1-8	0.9	"	.03	.15	1.2	14.4
	9-15	1.4	"	.21	1.60	11.2	
	16-23	1.0	"	.03	.16	1.3	
	24-30	0.9	"	.02	.10	0.7	
Dec. '42	1-8	0.7	"	.03	.11	0.9	4.0
	9-16	0.6	"	.03	.10	0.8	
	17-24	0.5	"	.025	.07	0.6	
	25-31	1.8	"	.025	.24	1.7	
Jan. '43	1-8	1.0	"	.02	.11	0.9	2.0
	9-16	0.7	"	.01	.04	0.3	
	17-24	0.7	"	.01	.04	0.3	
	25-31	0.6	"	.02	.07	0.5	
Feb. '43	1-7	0.6	"	.04	.13	0.9	14.4
	8-14	0.9	"	.04	.19	1.3	
	15-21	1.8	"	.04	.39	2.7	
	22-28	8.4	"	.03	1.36	9.5	
Mar. '43	1-8	3.3	"	.03	.53	4.2	274.1
	9-16	14.6	"	.25	19.70	157.5	
	17-24	9.7	"	.25	13.10	105.0	
	25-31	4.9	"	.04	1.06	7.4	
Apr. '43	1-8	2.4	"	.03	.39	3.1	4.6
	9-15	1.8	"	.01	.10	0.7	
	16-23	1.5	"	.01	.08	0.6	
	24-30	1.2	"	.005	.03	.2	
May '43	1-8	0.9	"	.020	.10	0.8	4.1
	9-16	0.8	"	.025	.11	0.9	
	17-24	1.0	"	.030	.16	1.3	
	25-31	0.9	"	.030	.15	1.1	
June '43	1-8	1.5	"	.19	1.50	12.0	22.7
	9-15	1.0	"	.09	.49	3.4	
	16-23	1.0	"	.07	.38	3.0	
	24-30	1.9	"	.06	.62	4.3	

WT-2

CLEMANS CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc Vol.S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.9	5.41	12.0	58	464	1,769
	9-16	1.2	"	12.0	78	624	
	17-24	0.9	"	12.0	58	464	
	25-31	0.6	"	9.5	31	217	
Aug. '42	1-8	1.5	"	7.0	57	456	994
	9-16	0.7	"	11.5	44	352	
	17-24	0.5	"	1.5	4	32	
	25-31	0.5	"	8.0	22	154	
Sept. '42	1-8	1.4	"	8.5	64	512	4,034
	9-15	1.9	"	23.5	241	1,690	
	16-23	1.5	"	26.5	215	1,720	
	24-30	0.2	"	14.5	16	112	
Oct. '42	1-8	0.9	"	6.5	32	256	1,113
	9-16	0.6	"	6.0	19	152	
	17-24	0.5	"	7.0	19	152	
	25-31	1.3	"	11.3	79	553	
Nov. '42	1-8	0.9-	"	7.5	36	288	971
	9-15	1.4	"	11.0	83	581	
	16-23	1.0	"	2.0	11	88	
	24-30	0.9	"	0.5	2	14	
Dec. '42	1-8-	0.7	"	1.5	6	48	206
	9-16	0.6	"	2.0	6	48	
	17-24	0.5	"	2.0	5	40	
	25-31	1.8	"	1.0	10	70	
Jan. '43	1-8	1.0	"	0.0	—	—	241
	9-16	0.7	"	1.5	6	48	
	17-24	0.7	"	3.0	11	88	
	25-31	0.6	"	4.5	15	105	
Feb. '43	1-7	0.6	"	2.0	7	49	1,078
	8-14	0.9	"	2.0	10	70	
	15-21	1.8	"	2.5	24	168	
	22-29	8.4	"	2.5	113	791	
Mar. '43	1-8	3.3	"	2.5	45	360	7,421
	9-16	14.6	"	5.3	418	3,340	
	17-24	9.7	"	8.0	419	3,350	
	25-30	4.9	"	2.0	53	371	
Apr. '43	1-8	2.4	"	2.0	26	208	510
	9-15	1.8	"	1.0	10	70	
	16-23	1.5	"	1.8	15	120	
	24-30	1.2	"	2.5	16	112	
May '43	1-8	0.9	"	2.0	10	80	488
	9-16	0.8	"	4.0	17	136	
	17-24	1.0	"	2.5	13	104	
	25-31	0.9	"	5.0	24	168	
June '43	1-8	1.5	"	8.5	69	552	2,043
	9-15	1.0	"	9.0	49	343	
	16-23	1.0	"	9.0	49	392	
	24-30	1.9	"	10.5	108	756	

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Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc Vol.S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.9	5.41	12.0	58	464	1,769
	9-16	1.2	"	12.0	78	624	
	17-24	0.9	"	12.0	58	464	
	25-31	0.6	"	9.5	31	217	
Aug. '42	1-8	1.5	"	7.0	57	456	
	9-16	0.7	"	11.5	44	352	994
	17-24	0.5	"	1.5	4	32	
	25-31	0.5	"	8.0	22	154	
Sept. '42	1-8	1.4	"	8.5	64	512	
	9-15	1.9	"	23.5	241	1,690	4,034
	16-23	1.5	"	26.5	215	1,720	
	24-30	0.2	"	14.5	16	112	
Oct. '42	1-8	0.9	"	6.5	32	256	
	9-16	0.6	"	6.0	19	152	1,113
	17-24	0.5	"	7.0	19	152	
	25-31	1.3	"	11.3	79	553	
Nov. '42	1-8	0.9-	"	7.5	36	288	
	9-15	1.4	"	11.0	83	581	971
	16-23	1.0	"	2.0	11	88	
	24-30	0.9	"	0.5	2	14	
Dec. '42	1-8-	0.7	"	1.5	6	48	
	9-16	0.6	"	2.0	6	48	206
	17-24	0.5	"	2.0	5	40	
	25-31	1.8	"	1.0	10	70	
Jan. '43	1-8	1.0	"	0.0	—	—	
	9-16	0.7	"	1.5	6	48	241
	17-24	0.7	"	3.0	11	88	
	25-31	0.6	"	4.5	15	105	
Feb. '43	1-7	0.6	"	2.0	7	49	
	8-14	0.9	"	2.0	10	70	1,078
	15-21	1.8	"	2.5	24	168	
	22-29	8.4	"	2.5	113	791	
Mar. '43	1-8	3.3	"	2.5	45	360	
	9-16	14.6	"	5.3	418	3,340	7,421
	17-24	9.7	"	8.0	419	3,350	
	25-30	4.9	"	2.0	53	371	
Apr. '43	1-8	2.4	"	2.0	26	208	
	9-15	1.8	"	1.0	10	70	510
	16-23	1.5	"	1.8	15	120	
	24-30	1.2	"	2.5	16	112	
May '43	1-8	0.9	"	2.0	10	80	
	9-16	0.8	"	4.0	17	136	488
	17-24	1.0	"	2.5	13	104	
	25-31	0.9	"	5.0	24	168	
June '43	1-8	1.5	"	8.5	69	552	
	9-15	1.0	"	9.0	49	343	2,043
	16-23	1.0	"	9.0	49	392	
	24-30	1.9	"	10.5	108	756	

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Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Org. N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.9	5.41	2.23	11	88	302
	9-16	1.2	"	2.23	14	112	
	17-24	0.9	"	2.23	11	88	
	25-31	0.6	"	.55	2	14	
Aug. '42	1-8	1.5	"	.41	3	24	62
	9-16	0.7	"	.54	2	16	
	17-24	0.5	"	.28	1	8	
	25-31	0.5	"	.70	2	14	
Sept. '42	1-8	1.4	"	.39	3	24	95
	9-15	1.9	"	.75	8	56	
	16-23	1.5	"	.10	1	8	
	24-30	0.2	"	.26	1	7	
Oct. '42	1-8	0.9	"	.41	2	16	83
	9-16	0.6	"	.71	2	16	
	17-24	0.5	"	.63	2	16	
	25-31	1.3	"	.64	5	35	
Nov. '42	1-8	0.9	"	.62	3	24	94
	9-15	1.4	"	.76	6	42	
	16-23	1.0	"	.43	2	16	
	24-30	0.9	"	.31	2	14	
Dec. '42	1-8	0.7	"	.25	1	8	45
	9-16	0.6	"	.34	1	8	
	17-24	0.5	"	.22	1	8	
	25-31	1.8	"	.27	3	21	
Jan. '43	1-8	1.0	"	.31	2	16	39
	9-16	0.7	"	.24	1	8	
	17-24	0.7	"	.24	1	8	
	25-31	0.6	"	.24	1	7	
Feb. '43	1-7	0.6	"	.28	1	7	140
	8-14	0.9	"	.40	2	14	
	15- 21	1.8	"	.30	3	21	
	22-28	8.4	"	.30	14	98	
Mar. '43	1-8	3.3	"	.33	6	48	986
	9-16	14.6	"	.67	53	424	
	17-24	9.7	"	1.00	52	416	
	25-31	4.9	"	.51	14	98	
Apr. '43	1-8	2.4	"	.35	5	40	99
	9-15	1.8	"	.26	3	21	
	16-23	1.5	"	.32	3	24	
	24-30	1.2	"	.37	2	14	
May '43	1-8	0.9	"	.35	2	16	68
	9-16	0.8	"	.26	1	8	
	17-24	1.0	"	.28	2	16	
	25-31	0.9	"	.71	4	28	
June '43	1-8	1.5	"	1.77	14	112	200
	9-15	1.0	"	.63	3	21	
	16-23	1.0	"	.65	4	32	
	24-30	1.9	"	.47	5	35	

WT-3 SWAN CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Inorg.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.6	5.41	.88	2.9	23	127
	9-16	0.7	"	1.37	5.2	42	
	17-24	0.5	"	1.85	5.0	40	
	25-31	0.3	"	1.95	3.2	22	
Aug. '42	1-8	0.9	"	2.95	14.4	115	165
	9-16	0.2	"	.88	1.0	8	
	17-24	0.3	"	1.72	2.8	22	
	25-31	0.3	"	1.81	2.9	20	
Sept. '42	1-8	0.9	"	.43	2.1	17	56
	9-15	1.0	"	.31	1.7	12	
	16-23	1.1	"	.28	1.7	14	
	24-30	0.4	"	.87	1.9	13	
Oct. '42	1-8	0.5	"	.37	1.0	8	85
	9-16	0.3	"	.86	1.4	11	
	17-24	0.2	"	2.10	2.3	18	
	25-31	0.9	"	1.40	6.8	48	
Nov. '42	1-8	0.5	"	1.68	4.5	36	128
	9-15	1.1	"	.44	2.6	18	
	16-23	0.6	"	1.24	4.0	32	
	24-30	0.5	"	2.21	6.0	42	
Dec. '42	1-8	0.3	"	3.04	4.9	39	280
	9-16	0.3	"	2.42	3.9	31	
	17-24	0.4	"	2.77	6.0	48	
	25-31	1.9	"	2.25	23.1	162	
Jan. '43	1-8	0.9	"	1.73	8.4	67	223
	9-16	0.5	"	2.49	6.7	54	
	17-24	0.5	"	2.51	6.8	54	
	25-31	0.5	"	2.53	6.8	48	
Feb. '43	1-7	0.4	"	2.40	5.2	36	1,034
	8-14	0.7	"	1.81	6.8	48	
	15-21	1.6	"	3.10	26.8	187	
	22-28	6.3	"	3.21	109.0	763	
Mar. '43	1-8	1.8	"	3.32	32.4	259	3,180
	9-16	13.5	"	2.96	216.0	1,730	
	17-24	9.3	"	2.60	131.0	1,050	
	25-31	4.3	"	.87	20.2	141	
Apr. '43	1-8	1.5	"	.62	5.0	40	112
	9-15	1.1	"	.71	4.2	29	
	16-23	1.0	"	.65	3.5	28	
	24-30	0.7	"	.58	2.2	15	
May '43	1-8	0.5	"	.65	1.8	14	65
	9-16	0.5	"	.95	2.6	21	
	17-24	0.6	"	.85	2.8	22	
	25-31	0.5	"	.46	1.2	8	
June '43	1-8	0.5	"	.60	1.6	13	138
	9-15	0.5	"	1.44	3.9	27	
	16-23	0.6	"	1.63	5.3	42	
	24-30	1.0	"	1.47	8.0	56	

WT-3

SWAN CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Sol.P. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.6	5.41	.28	.91	7.3	13.1
	9-16	0.7	"	.10	.38	3.0	
	17-24	0.5	"	.10	.27	2.2	
	25-31	0.3	"	.05	.08	0.6	
Aug. '42	1-8	0.9	"	.10	.49	3.9	5.4
	9-16	0.2	"	.04	.04	0.3	
	17-24	0.3	"	.05	.08	0.6	
	25-31	0.3	"	.05	.08	0.6	
Sept. '42	1-8	0.9	"	.21	.10	0.8	2.9
	9-15	1.0	"	.19	.10	0.7	
	16-23	1.1	"	.25	.15	1.2	
	24-30	0.4	"	.12	.03	0.2	
Oct. '42	1-8	0.5	"	.04	.11	0.9	4.5
	9-16	0.3	"	.05	.08	0.6	
	17-24	0.2	"	.04	.04	0.3	
	25-31	0.9	"	.08	.39	2.7	
Nov. '42	1-8	0.5	"	.04	.11	0.9	4.1
	9-15	1.1	"	.28	.17	1.2	
	16-23	0.6	"	.06	.19	1.5	
	24-30	0.5	"	.025	.07	0.5	
Dec. '42	1-8	0.3	"	.035	.06	0.5	3.5
	9-16	0.3	"	.025	.04	0.3	
	17-24	0.4	"	.03	.06	0.5	
	25-31	1.9	"	.03	.31	2.2	
Jan. '43	1-8	0.9	"	.025	.12	1.0	2.2
	9-16	0.5	"	.020	.05	0.4	
	17-24	0.5	"	.020	.05	0.4	
	25-31	0.5	"	.020	.05	0.4	
Feb. '43	1-7	0.4	"	.04	.09	0.6	8.9
	8-14	0.7	"	.03	.11	0.8	
	15-21	1.6	"	.025	.22	1.5	
	22-28	6.3	"	.025	.85	6.0	
Mar. '43	1-8	1.8	"	.02	.19	1.5	47.5
	9-16	13.5	"	.04	2.92	23.4	
	17-24	9.3	"	.04	2.01	16.1	
	25-31	4.3	"	.04	.93	6.5	
Apr. '43	1-8	1.5	"	.02	.16	1.3	3.6
	9-15	1.1	"	.02	.12	0.8	
	16-23	1.0	"	.02	.11	0.9	
	24-30	0.7	"	.02	.08	0.6	
May '43	1-8	0.5	"	.03	.08	0.6	3.9
	9-16	0.5	"	.04	.11	0.9	
	17-24	0.6	"	.05	.16	1.3	
	25-31	0.5	"	.06	.16	1.1	
June '43	1-8	0.5	"	.15	.41	3.3	12.8
	9-15	0.5	"	.11	.30	2.1	
	16-23	0.6	"	.14	.45	3.6	
	24-30	1.0	"	.10	.54	3.8	

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SWAN CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Vol. S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.6	5.41	16.0	52	416	1,097
	9-16	0.7	"	11.8	45	360	
	17-24	0.5	"	7.5	20	160	
	25-31	0.3	"	14.5	23	161	
Aug. '42	1-8	0.9	"	5.5	27	216	347
	9-16	0.2	"	6.0	6	48	
	17-24	0.3	"	4.0	6	48	
	25-31	0.3	"	3.0	5	35	
Sept. '42	1-8	0.9	"	4.5	22	176	646
	9-15	1.0	"	3.5	19	133	
	16-23	1.1	"	6.0	36	288	
	24-30	0.4	"	3.0	7	49	
Oct. '42	1-8	0.5	"	6.5	18	144	816
	9-16	0.3	"	3.0	5	40	
	17-24	0.2	"	8.5	9	72	
	25-31	0.9	"	16.5	80	560	
Nov. '42	1-8	0.5	"	2.5	7	56	390
	9-15	1.1	"	4.5	27	189	
	16-23	0.6	"	1.5	5	40	
	24-30	0.5	"	5.5	15	105	
Dec. '42	1-8	0.3	"	3.5	6	48	115
	9-16	0.3	"	1.0	2	16	
	17-24	0.4	"	1.0	2	16	
	25-31	1.9	"	0.5	5	35	
Jan. '43	1-8	0.9	"	0.0	--	--	99
	9-16	0.5	"	1.0	3	24	
	17-24	0.5	"	2.0	5	40	
	25-31	0.5	"	2.0	5	35	
Feb. '43	1-7	0.4	"	1.0	2	14	343
	8-14	0.7	"	1.0	4	28	
	15-21	1.6	"	1.0	9	63	
	22-28	6.3	"	1.0	34	238	
Mar. '43	1-8	1.8	"	1.0	10	80	4,171
	9-16	13.5	"	2.8	204	1,630	
	17-24	9.3	"	4.5	226	1,810	
	25-31	4.3	"	4.0	93	651	
Apr. '43	1-8	1.5	"	3.0	24	192	465
	9-15	1.1	"	2.0	12	84	
	16-23	1.0	"	2.5	14	112	
	24-30	0.7	"	3.0	11	77	
May '43	1-8	0.5	"	3.5	9	72	425
	9-16	0.5	"	4.0	11	88	
	17-24	0.6	"	4.0	13	104	
	25-31	0.5	"	8.5	23	161	
June '43	1-8	0.5	"	13.0	35	280	515
	9-15	0.5	"	2.5	7	49	
	16-23	0.6	"	3.5	11	88	
	24-30	1.0	"	2.5	14	98	

WT-3

SWAN CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Org.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.6	5.41	2.15	7	56	111
	9-16	0.7	"	1.28	5	40	
	17-24	0.5	"	.36	1	8	
	25-31	0.3	"	.66	1	7	
Aug. '42	1-8	0.9	"	.32	2	16	39
	9-16	0.2	"	.38	1	8	
	17-24	0.3	"	.24	1	8	
	25-31	0.3	"	.22	1	7	
Sept. '42	1-8	0.9	"	.58	3	24	76
	9-15	1.0	"	.56	3	21	
	16-23	1.1	"	.52	3	24	
	24-30	0.4	"	.47	1	7	
Oct. '42	1-8	0.5	"	.37	1	8	52
	9-16	0.3	"	.40	1	8	
	17-24	0.2	"	.41	1	8	
	25-31	0.9	"	.86	4	28	
Nov. '42	1-8	0.5	"	.42	1	8	44
	9-15	1.1	"	.56	3	21	
	16-23	0.6	"	.37	1	8	
	24-30	0.5	"	.33	1	7	
Dec. '42	1-8	0.3	"	.29	1	8	38
	9-16	0.3	"	.26	1	8	
	17-24	0.4	"	.22	1	8	
	25-31	1.9	"	.20	2	14	
Jan. '43	1-8	0.9	"	.27	1	8	31
	9-16	0.5	"	.26	1	8	
	17-24	0.5	"	.23	1	8	
	25-31	0.5	"	.20	1	7	
Feb. '43	1-7	0.4	"	.27	1	7	42
	8-14	0.7	"	.31	1	7	
	15-21	1.6	"	.27	2	14	
	22-28	6.3	"	.23	1	7	
Mar. '43	1-8	1.8	"	.27	3	24	782
	9-16	13.5	"	.56	41	328	
	17-24	9.3	"	.74	38	304	
	25-31	4.3	"	.74	18	126	
Apr. '43	1-8	1.5	"	.48	4	32	76
	9-15	1.1	"	.39	2	14	
	16-23	1.0	"	.40	2	16	
	24-30	0.7	"	.41	2	14	
May '43	1-8	0.5	"	.61	2	16	47
	9-16	0.5	"	.47	1	8	
	17-24	0.6	"	.52	2	16	
	25-31	0.5	"	.39	1	7	
June '43	1-8	0.5	"	1.27	3	24	60
	9-15	0.5	"	.54	2	14	
	16-23	0.6	"	.42	1	8	
	24-30	1.0	"	.35	2	14	

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148<YAHARA RIVER AT OUTLET OF WAUBESA

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Inorg.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	62.6	5.41	.18	61	488	3,174
	9-16	98.0	"	.18	95	760	
	17-24	121.6	"	.17	112	896	
	25-31	104.6	"	.26	147	1,030	
Aug. '42	1-8	103.4	"	.49	274	2,190	7,980
	9-16	94.0	"	.42	213	1,700	
	17-24	76.3	"	.65	268	2,140	
	25-31	66.1	"	.78	279	1,950	
Sept. '42	1-8	68.4	"	.73	270	2,160	14,025
	9-15	101.4	"	.76	417	2,920	
	16-23	146.8	"	.77	611	4,885	
	24-30	134.2	"	.80	581	4,060	
Oct. '42	1-8	113.2	"	1.08	662	5,300	12,155
	9-16	120.5	"	.74	484	3,870	
	17-24	114.8	"	.32	198	1,585	
	25-31	62.6	"	.59	200	1,400	
Nov. '42	1-8	58.7	"	.67	213	1,705	28,115
	9-15	152.0	"	1.27	1,045	7,310	
	16-23	198.8	"	1.22	1,308	10,450	
	24-30	202.1	"	1.13	1,235	8,650	
Dec. '42	1-8	184.0	"	1.11	1,105	8,840	31,270
	9-16	163.6	"	1.07	947	7,580	
	17-24	140.7	"	1.15	875	7,000	
	25-31	146.0	"	1.42	1,120	7,850	
Jan. '43	1-8	150	"	1.59	1,290	10,300	39,670
	9-16	142	"	1.52	1,165	9,330	
	17-24	147	"	1.59	1,265	10,100	
	25-31	145	"	1.81	1,420	9,940	
Feb. '43	1-7	171	"	1.87	1,730	12,100	64,100
	8-14	188	"	2.06	2,095	14,650	
	15-21	198	"	2.24	2,400	16,800	
	22-28	259	"	2.10	2,940	20,550	
Mar. '43	1-8	245	"	2.49	3,300	26,400	125,200
	9-16	263	"	2.31	3,280	26,300	
	17-24	438	"	2.15	5,090	40,700	
	25-31	455	"	1.85	4,550	31,800	
Apr. '43	1-8	416	"	1.52	3,420	27,400	64,070
	9-15	375	"	1.33	2,700	18,900	
	16-23	343	"	.65	1,205	9,650	
	24-30	321	"	.67	1,160	8,120	
May '43	1-8	227	"	.56	687	5,500	15,865
	9-16	126	"	.61	416	3,330	
	17-24	99	"	.79	423	3,385	
	25-31	138	"	.70	522	3,650	
June '43	1-8	269	"	.90	1,310	10,490	17,789
	9-15	147	"	.87	692	4,840	
	16-23	71	"	.66	253	2,025	
	24-30	67	"	.17	62	434	

WO-4 149< YAHARA RIVER AT OUTLET OF WAUBESA

Month	Period	Avg. Flow C.F.S.	Factor	Avg. Conc. Sol. P. P.P.M.	Lbs. Per Day	Lbs. Per Period	Total Lbs. Per Month
July '42	1-8	62.6	5.41	.29	98	784	5,434
	9-16	98.0	"	.25	132	1,055	
	17-24	121.6	"	.33	217	1,735	
	25-31	104.6	"	.47	266	1,860	
Aug. '42	1-8	103.4	"	.51	285	2,280	7,775
	9-16	94.0	"	.53	259	2,070	
	17-24	76.3	"	.56	231	1,850	
	25-31	66.1	"	.63	225	1,575	
Sept. '42	1-8	68.4	"	.68	252	2,015	10,635
	9-15	101.4	"	.56	308	2,160	
	16-23	146.8	"	.49	389	3,110	
	24-30	134.2	"	.66	479	3,350	
Oct. '42	1-8	113.2	"	.36	221	1,770	8,305
	9-16	120.5	"	.52	340	2,720	
	17-24	114.8	"	.43	344	2,750	
	25-31	62.6	"	.45	152	1,065	
Nov. '42	1-8	58.7	"	.52	165	1,320	11,580
	9-15	152.0	"	.57	469	3,280	
	16-23	198.8	"	.47	503	4,020	
	24-30	202.1	"	.39	426	2,960	
Dec. '42	1-8	184.0	"	.45	448	3,580	11,050
	9-16	163.6	"	.35	309	2,470	
	17-24	140.7	"	.43	327	2,620	
	25-31	146.0	"	.43	340	2,380	
Jan. '43	1-8	150	"	.35	284	2,270	9,220
	9-16	142	"	.38	291	2,330	
	17-24	147	"	.33	262	2,100	
	25-31	145	"	.46	360	2,520	
Feb. '43	1-7	171	"	.42	388	2,720	11,610
	8-14	188	"	.34	346	2,420	
	15-21	198	"	.34	364	2,550	
	22-28	259	"	.40	560	3,920	
Mar. '43	1-8	245	"	.31	410	3,280	17,050
	9-16	263	"	.35	497	3,980	
	17-24	438	"	.33	780	6,250	
	25-31	455	"	.21	516	3,540	
Apr. '43	1-8	416	"	.24	540	4,320	11,500
	1-15	375	"	.24	486	3,400	
	16-23	343	"	.10	185	1,480	
	24-30	321	"	.19	329	2,300	
May '43	1-8	227	"	.15	184	1,470	5,310
	9-16	126	"	.20	136	1,090	
	17-24	99	"	.29	155	1,240	
	25-31	138	"	.29	216	1,510	
June '43	1-8	269	"	.39	566	4,530	8,312
	9-15	147	"	.35	278	1,945	
	16-23	71	"	.33	127	1,015	
	24-30	67	"	.32	116	822	

WO-4 150< YAHARA RIVER AT OUTLET OF WAUBESA

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Vol.S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	62.6	5.41	14.0	4,730	37,800	186,300
	9-16	98.0	"	11.3	5,990	47,900	
	17-24	121.6	"	15.3	10,100	80,800	
	25-31	104.6	"	5.0	2,830	19,800	
Aug. '42	1-8	103.4	"	9.3	5,200	41,600	104,750
	9-16	94.0	"	8.0	4,060	32,500	
	17-24	76.3	"	5.5	2,270	18,150	
	25-31	66.1	"	5.0	1,785	12,500	
Sept. '42	1-8	68.4	"	3.5	1,295	10,030	69,130
	9-15	101.4	"	4.0	2,200	15,400	
	16-23	146.8	"	2.5	1,980	15,800	
	24-30	134.2	"	5.5	3,990	27,900	
Oct. '42	1-8	113.2	"	8.5	5,210	41,600	101,650
	9-16	120.5	"	2.5	1,630	13,050	
	17-24	114.8	"	5.5	4,400	35,200	
	25-31	62.6	"	5.0	1,690	11,800	
Nov. '42	1-8	58.7	"	2.0	640	5,100	195,150
	9-15	152.0	"	5.5	4,520	31,650	
	16-23	198.8	"	14.5	15,530	124,000	
	24-30	202.1	"	4.5	4,920	34,400	
Dec. '42	1-8	184.0	"	3.5	3,480	27,800	75,100
	9-16	163.6	"	2.5	2,210	17,700	
	17-24	140.7	"	3.5	2,660	21,300	
	25-31	146.0	"	1.5	1,185	8,300	
Jan. '43	1-8	150	"	1.0	815	6,520	34,210
	9-16	142	"	2.0	1,530	12,250	
	17-24	147	"	2.0	1,590	12,700	
	25-31	145	"	0.5	392	2,740	
Feb. '43	1-7	171	"	1.5	1,385	9,700	41,510
	8-14	188	"	0.5	510	3,570	
	15-21	198	"	0.5	535	3,740	
	22-28	259	"	2.5	3,500	24,500	
Mar. '43	1-8	245	"	2.0	2,650	21,200	218,400
	9-16	263	"	2.5	3,550	28,400	
	17-24	438	"	5.3	12,530	100,000	
	25-31	455	"	4.0	9,840	68,800	
Apr. '43	1-8	416	"	2.5	5,620	45,000	410,300
	9-15	375	"	7.5	15,200	106,200	
	16-23	343	"	11.0	20,200	162,000	
	24-31	321	"	8.0	13,880	97,100	
May '43	1-8	227	"	8.3	10,200	81,600	169,800
	9-16	126	"	8.5	5,800	46,400	
	17-24	99	"	4.5	2,410	19,300	
	25-31	138	"	4.3	3,210	22,500	
June '43	1-8	269	"	2.8	4,060	32,500	112,200
	9-15	147	"	2.5	1,985	13,900	
	16-23	71	"	7.0	2,690	21,500	
	24-30	67	"	17.5	6,330	44,300	

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YAHARA RIVER AT OUTLET OF WAUBESA

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Org.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	62.6	5.41	1.30	439	3,510	16,125
	9-16	98.0	"	.95	504	4,030	
	17-24	122	"	1.25	825	6,600	
	25-31	105	"	.50	284	1,985	
Aug. '42	1-8	103	"	1.19	662	5,300	12,245
	9-16	94.0	"	.72	366	2,930	
	17-24	76	"	.72	296	2,370	
	25-31	66	"	.66	235	1,645	
Sept. '42	1-8	68	"	.62	228	1,825	12,395
	9-15	101	"	.70	382	2,670	
	16-23	147	"	.67	533	4,260	
	24-30	134	"	.72	521	3,640	
Oct. '42	1-8	113	"	.93	568	4,540	14,605
	9-16	121	"	.64	408	3,270	
	17-24	115	"	1.00	621	4,970	
	25-31	62.6	"	.77	261	1,825	
Nov. '42	1-8	58.7	"	.65	207	1,660	24,960
	9-15	152	"	.90	740	5,180	
	16-23	199	"	1.50	1,615	12,920	
	24-30	202	"	.68	743	5,200	
Dec. '42	1-8	184	"	.63	628	5,030	20,220
	9-16	164	"	.84	745	5,960	
	17-24	141	"	.78	594	4,750	
	25-31	146	"	.81	640	4,480	
Jan. '43	1-8	150	"	.71	575	4,600	15,990
	9-16	142	"	.68	522	4,180	
	17-24	147	"	.59	468	3,750	
	25-31	145	"	.63	495	3,460	
Feb. '43	1-7	171	"	.87	805	5,630	22,130
	8-14	188	"	.71	721	5,050	
	15-21	198	"	.73	782	5,470	
	22-28	259	"	.61	855	5,980	
Mar. '43	1-8	245	"	.90	1,190	9,520	54,930
	9-16	263	"	.76	1,080	8,640	
	17-24	438	"	.85	2,015	16,120	
	25-31	455	"	1.20	2,950	20,650	
Apr. '43	1-8	416	"	.92	2,065	16,520	65,970
	9-15	375	"	1.25	2,535	17,750	
	16-23	343	"	1.25	2,320	18,550	
	24-30	321	"	1.08	1,880	13,150	
May '43	1-8	227	"	1.19	1,460	11,680	24,680
	9-16	126	"	.94	640	5,120	
	17-24	99	"	.84	450	3,600	
	25-31	138	"	.82	612	4,280	
June '43	1-8	269	"	.72	1,045	8,350	24,650
	9-15	147	"	.76	604	4,230	
	16-23	71	"	2.35	904	7,230	
	24-30	67	"	1.91	691	4,840	

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YAHARA RIVER AT INLET TO KEGONSA

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Inorg.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	62.6	5.41	.12	41	328	1,906
	9-16	98.0	"	.12	64	512	
	17-24	121.6	"	.12	79	632	
	25-31	104.6	"	.11	62	434	
Aug. '42	1-8	103.4	"	.20	112	896	2,649
	9-16	94.0	"	.18	91	728	
	17-24	76.3	"	.16	66	528	
	25-31	66.1	"	.20	71	497	
Sept. '42	1-8	68.4	"	.42	155	1,240	9,159
	9-15	101.4	"	.45	247	1,729	
	16-23	146.8	"	.47	373	2,990	
	24-30	134.2	"	.63	458	3,200	
Oct. '42	1-8	113.2	"	.40	245	1,960	5,885
	9-16	120.5	"	.37	241	1,930	
	17-24	114.8	"	.22	136	1,090	
	25-31	62.6	"	.38	129	905	
Nov. '42	1-8	58.7	"	.43	137	1,095	17,855
	9-15	152.0	"	1.07	880	6,160	
	16-23	198.8	"	1.15	1,230	9,850	
	24-30	202.1	"	.98	1,070	750	
Dec. '42	1-8	181.1	"	.98	962	7,700	22,135
	9-16	163.6	"	1.05	930	7,440	
	17-24	140.7	"	1.03	783	6,260	
	25-31	146.0	"	1.33	1,050	735	
Jan. '43	1-8	150	"	1.29	1,045	8,370	36,830
	9-16	142	"	1.43	1,100	8,800	
	17-24	147	"	1.66	1,320	10,560	
	25-31	145	"	1.66	1,300	9,100	
Feb. '43	1-7	171	"	1.97	1,820	12,640	59,010
	8-14	188	"	2.11	2,145	15,000	
	15-21	198	"	1.97	2,110	14,770	
	22-28	259	"	1.68	2,370	16,600	
Mar. '43	1-8	245	"	2.18	2,890	23,100	113,950
	9-16	263	"	2.03	2,890	23,100	
	17-24	438	"	1.87	4,430	35,400	
	25-31	455	"	1.88	4,620	32,350	
Apr. '43	1-8	416	"	1.63	3,670	29,350	59,820
	9-15	375	"	.88	1,785	12,500	
	16-23	343	"	.80	1,485	11,880	
	24-30	321	"	.50	870	6,090	
May '43	1-8	227	"	.31	380	3,200	11,900
	9-16	128	"	.56	382	3,280	
	17-24	99	"	.57	305	2,440	
	25-31	138	"	.57	426	2,980	
June '43	1-8	269	"	.77	1,120	8,960	12,893
	9-15	147	"	.51	405	2,840	
	16-23	71	"	.15	57	456	
	24-30	67	"	.25	91	637	

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YAHARA RIVER AT INLET TO KEGONSA

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Sol.P. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	63	5.41	.28	95	760	4,844
	9-16	98	"	.28	148	1,184	
	17-24	122	"	.28	184	1,470	
	25-31	105	"	.36	204	1,430	
Aug. '42	1-8	103	"	.40	224	1,790	6,215
	9-16	94	"	.46	234	1,870	
	17-24	76	"	.41	169	1,350	
	25-31	66	"	.48	172	1,205	
Sept. '42	1-8	68	"	.44	163	1,305	8,050
	9-15	101	"	.44	241	1,685	
	16-23	147	"	.38	302	2,415	
	24-30	134	"	.52	378	2,645	
Oct. '42	1-8	113	"	.40	245	1,960	7,465
	9-16	120	"	.42	274	2,190	
	17-24	115	"	.46	287	2,295	
	25-31	63	"	.43	146	1,020	
Nov. '42	1-8	59	"	.37	118	944	9,964
	9-15	152	"	.39	321	2,250	
	16-23	199	"	.46	492	3,940	
	24-30	202	"	.37	404	2,830	
Dec. '42	1-8	184	"	.33	324	2,590	8,970
	9-16	164	"	.34	301	2,410	
	17-24	141	"	.37	282	2,255	
	25-31	146	"	.31	245	1,715	
Jan. '43	1-8	150	"	.32	260	2,080	7,470
	9-16	142	"	.29	223	1,785	
	17-24	147	"	.29	231	1,850	
	25-31	145	"	.32	251	1,755	
Feb. '43	1-7	171	"	.43	398	2,785	11,250
	8-14	188	"	.37	376	2,630	
	15-21	198	"	.40	428	2,995	
	22-28	259	"	.29	406	2,840	
Mar. '43	1-8	245	"	.35	464	3,710	17,415
	9-16	263	"	.31	441	3,525	
	17-24	438	"	.31	735	5,880	
	25-31	455	"	.25	615	4,300	
Apr. '43	1-8	416	"	.24	540	4,320	13,505
	9-15	375	"	.25	506	3,540	
	16-23	343	"	.25	463	3,700	
	24-30	321	"	.16	278	1,945	
May '43	1-8	227	"	.09	110	880	4,256
	9-16	126	"	.19	130	1,040	
	17-24	99	"	.19	102	816	
	25-31	138	"	.29	217	1,520	
June '43	1-8	269	"	.29	421	3,370	6,544
	9-15	147	"	.29	231	1,615	
	16-23	71	"	.27	103	824	
	24-30	67	"	.29	105	735	

KT-1 YAHARA RIVER AT INLET TO KEGONSA

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Vol.S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	63	5.41	21.5	7,270	58,150	333,750
	9-16	98	"	21.5	11,400	91,200	
	17-24	122	"	21.5	14,130	113,000	
	25-31	105	"	18.0	10,200	71,400	
Aug. '42	1-8	103	"	11.5	6,440	51,500	176,300
	9-16	94	"	10.0	5,080	40,600	
	17-24	76	"	11.5	4,750	38,000	
	25-31	66	"	18.5	6,610	46,200	
Sept. '42	1-8	68	"	8.5	3,140	25,100	115,430
	9-15	101	"	8.5	4,660	31,900	
	16-23	147	"	8.0	6,350	50,800	
	24-30	134	"	1.5	1,090	7,630	
Oct. '42	1-8	113	"	13.0	7,960	63,600	134,510
	9-16	120	"	2.5	1,630	13,030	
	17-24	115	"	9.5	5,900	47,200	
	25-31	63	"	4.5	1,525	10,680	
Nov. '42	1-8	59	"	3.0	955	7,650	139,650
	9-15	152	"	10.5	8,650	60,500	
	16-23	199	"	7.0	7,500	60,000	
	24-30	202	"	1.5	1,640	11,500	
Dec. '42	1-8	184	"	3.0	2,940	23,500	94,150
	9-16	164	"	4.0	3,540	28,300	
	17-24	141	"	4.0	3,220	25,750	
	25-31	146	"	3.0	2,370	16,600	
Jan. '43	1-8	150	"	3.5	2,840	22,700	46,600
	9-16	142	"	1.0	770	6,150	
	17-24	147	"	1.5	1,190	9,520	
	25-31	145	"	1.5	1,175	8,230	
Feb. '43	1-7	171	"	0.0	--	--	47,250
	8-14	188	"	3.0	3,050	21,300	
	15-21	198	"	1.5	1,605	11,250	
	22-28	259	"	1.5	2,100	14,700	
Mar. '43	1-8	245	"	3.0	3,970	31,750	221,750
	9-16	263	"	3.3	4,690	37,500	
	17-24	438	"	3.5	8,300	66,400	
	25-31	455	"	5.0	12,300	86,100	
Apr. '43	1-8	416	"	7.0	15,750	126,000	837,000
	9-15	375	"	22.5	45,600	319,000	
	16-23	343	"	17.0	31,500	252,000	
	24-30	321	"	11.5	20,000	140,000	
May '43	1-8	227	"	14.5	17,800	142,300	238,200
	9-16	126	"	8.0	5,450	43,600	
	17-24	99	"	5.5	2,950	23,600	
	25-31	138	"	5.5	4,100	28,700	
June '43	1-8	269	"	3.5	5,080	40,640	143,940
	9-15	147	"	7.0	5,560	38,900	
	16-23	71	"	11.5	4,410	35,300	
	24-30	67	"	11.5	4,160	29,100	

KT-1 YAHARA RIVER AT INLET TO KEGONSA

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Org.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	63	5.41	1.10	375	3,000	16,910
	9-16	98	"	1.10	583	4,660	
	17-24	122	"	1.00	660	5,280	
	25-31	105	"	1.00	567	3,970	
Aug. '42	1-8	103	"	1.11	618	4,950	14,880
	9-16	94	"	1.00	508	4,060	
	17-24	76	"	.86	353	2,820	
	25-31	66	"	1.22	436	3,050	
Sept. '42	1-8	68	"	.72	265	2,120	12,880
	9-15	101	"	.75	409	2,860	
	16-23	147	"	.78	620	4,960	
	24-30	134	"	.58	420	2,940	
Oct. '42	1-8	113	"	.96	586	4,690	15,110
	9-16	120	"	.70	454	3,630	
	17-24	115	"	.93	578	4,620	
	25-31	63	"	.91	310	2,170	
Nov. '42	1-8	59	"	.58	185	1,480	20,940
	9-15	152	"	.98	806	5,640	
	16-23	199	"	.85	915	7,320	
	24-31	202	"	.85	928	6,500	
Dec. '42	1-8	184	"	.66	655	5,240	22,200
	9-16	164	"	1.10	975	7,800	
	17-24	141	"	.87	662	5,300	
	25-31	146	"	.70	552	3,860	
Jan. '43	1-8	150	"	.75	608	4,860	18,650
	9-16	142	"	.90	690	5,520	
	17-24	147	"	.70	555	4,440	
	25-31	145	"	.70	548	3,830	
Feb. '43	1-7	171	"	.77	712	4,980	24,270
	8-12	188	"	.84	855	5,990	
	15-21	198	"	.73	781	5,460	
	22-28	259	"	.80	1,120	7,840	
Mar. '43	1-8	245	"	.74	982	7,850	49,730
	9-16	263	"	.80	1,135	9,080	
	17-24	438	"	.86	2,035	16,300	
	25-31	455	"-	.96	2,360	16,500	
Apr. '43	1-8	416	"	.80	1,800	14,400	86,180
	9-15	375	"	2.15	4,360	30,500	
	16-23	343	"	1.72	3,190	25,500	
	24-30	321	"	1.30	2,255	15,780	
May '43	1-8	227	"	1.43	1,750	14,000	26,400
	9-16	126	"	1.00	681	5,450	
	17-24	99	"	.83	444	3,550	
	25-31	138	"	.66	492	3,400	
June '43	1-8	269	"	.78	1,135	9,080	20,090
	9-15	147	"	.84	667	4,670	
	16-23	71	"	1.30	498	3,980	
	24-30	67	"	.93	337	2,360	

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DOOR CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Inorg. N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	5.6	5.41	2.10	67	536	2,035
	9-16	7.0	"	2.10	79	632	
	17-24	6.6	"	1.54	55	440	
	25-31	5.6	"	1.91	61	427	
Aug. '42	1-8	8.6	"	1.93	90	720	1,316
	9-16	5.2	"	1.29	36	288	
	17-24	4.4	"	.89	21	168	
	25-31	4.1	"	.91	20	140	
Sept. '42	1-8	5.5	"	1.73	51	408	2,203
	9-15	6.7	"	1.09	40	280	
	16-23	10.9	"	1.72	101	808	
	24-30	7.5	"	2.49	101	707	
Oct. '42	1-8	6.3	"	1.69	57	456	1,491
	9-16	6.0	"	1.67	54	432	
	17-24	5.4	"	1.66	48	384	
	25-31	6.6	"	3.29	117	219	
Nov. '42	1-8	9.3	"	2.94	148	1,184	20,444
	9-15	16.8	"	15.37	1,400	9,800	
	16-23	10.9	"	16.11	950	7,600	
	24-30	9.7	"	5.08	266	1,860	
Dec. '42	1-8	8.6	"	2.98	139	1,110	4,626
	9-16	8.0	"	2.58	112	896	
	17-24	7.3	"	2.52	100	800	
	25-31	12.1	"	3.99	260	1,820	
Jan. '43	1-8	7.8	"	5.46	230	1,840	5,065
	9-16	7.9	"	3.67	157	1,255	
	17-24	7.9	"	3.20	137	1,095	
	25-31	7.8	"	2.96	125	875	
Feb. '43	1-7	7.6	"	2.71	111	777	15,817
	8-14	7.3	"	2.27	90	630	
	15-21	12.6	"	2.74	187	1,310	
	22-28	53.4	"	6.47	1,870	13,100	
Mar. '43	1-8	18.4	"	6.26	620	4,960	65,860
	9-16	110.0	"	6.36	3,780	30,200	
	17-24	80.0	"	6.46	2,790	22,800	
	25-31	29.1	"	7.61	1,200	8,400	
Apr. '43	1-8	19.0	"	8.96	920	7,350	15,557
	9-15	16.9	"	4.33	396	2,770	
	16-23	18.1	"	4.16	408	3,260	
	24-30	14.4	"	3.99	311	2,177	
May '43	1-8	12.1	"	2.62	171	1,370	4,120
	9-16	10.1	"	2.29	125	1,000	
	17-24	11.1	"	1.98	118	945	
	25-31	10.8	"	1.98	115	805	
June '43	1-8	21.9	"	2.03	240	1,920	4,771
	9-15	10.5	"	1.97	112	784	
	16-23	11.2	"	1.72	114	912	
	24-30	17.6	"	1.73	165	1,155	

KT-2 DOOR CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Sol.P. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	5.6	5.41	.05	1.5	12	61
	9-16	7.0	"	.07	2.7	22	
	17-24	6.6	"	.06	2.1	17	
	25-31	5.6	"	.05	1.5	10	
Aug. '42	1-8	8.6	"	.12	5.6	45	75
	9-16	5.2	"	.055	1.6	13	
	17-24	4.4	"	.04	1.0	8	
	25-31	4.1	"	.06	1.3	9	
Sept. '42	1-8	5.5	"	.05	1.5	12	134
	9-15	6.7	"	.06	2.2	15	
	16-23	10.9	"	.21	12.4	99	
	24-30	7.5	"	.03	1.2	8	
Oct. '42	1-8	6.3	"	.06	2.0	16	38
	9-16	6.0	"	.03	1.0	8	
	17-24	5.4	"	.025	0.7	6	
	25-31	6.6	"	.03	1.1	8	
Nov. '42	1-8	9.3	"	.04	2.0	16	183
	9-15	16.8	"	.22	20.1	141	
	16-23	10.9	"	.04	2.4	19	
	24-30	9.7	"	.02	1.0	7	
Dec. '42	1-8	8.6	"	.02	0.9	7	36
	9-16	8.0	"	.04	1.7	14	
	17-24	7.3	"	.02	0.8	6	
	25-31	12.1	"	.02	1.3	9	
Jan. '43	1-8	7.8	"	.03	1.3	10	39
	9-16	7.9	"	.03	1.3	10	
	17-24	7.9	"	.03	1.3	10	
	25-31	7.8	"	.03	1.3	9	
Feb. '43	1-7	7.6	"	.03	1.2	8	105
	8-14	7.3	"	.02	0.8	6	
	15-21	12.6	"	.02	1.4	10	
	22-28	53.4	"	.04	11.5	81	
Mar. '43	1-8	18.3	"	.02	2.0	16	471
	9-16	110.0	"	.05	29.8	238	
	17-24	80.0	"	.05	21.6	173	
	25-31	29.1	"	.04	6.3	44	
Apr. '43	1-8	19.0	"	.03	3.1	25	65
	9-15	16.9	"	.02	1.8	13	
	16-23	18.1	"	.02	2.0	16	
	24-30	14.4	"	.02	1.6	11	
May '43	1-8	12.1	"	.02	1.3	10	50
	9-16	10.1	"	.035	1.9	15	
	17-24	11.1	"	.035	2.1	17	
	25-31	10.8	"	.020	1.2	8	
June '43	1-8	21.9	"	.11	13.0	104	198
	9-15	10.5	"	.05	2.8	20	
	16-23	11.2	"	.07	4.2	34	
	24-30	17.6	"	.06	5.7	40	

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Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Vol.S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	5.6	5,41	7.0	212	1,695	6,595
	9-16	7.0	"	7.0	265	2,120	
	17-24	6.6	"	7.8	278	2,220	
	25-31	5.6	"	2.5	80	560	
Aug. '42	1-8	8.6	"	2.0	93	744	3,530
	9-16	5.2	"	8.5	239	1,910	
	17-24	4.4	"	3.0	71	568	
	25-31	4.1	"	2.0	44	308	
Sept. '42	1-8	5.5	"	2.0	60	480	6,812
	9-15	6.7	"	3.0	109	763	
	16-23	10.9	"	10.0	590	4,715	
	24-30	7.5	"	3.0	122	854	
Oct. '42	1-8	6.3	"	3.0	102	816	2,313
	9-16	6.0	"	2.5	81	648	
	17-24	5.4	"	1.5	44	352	
	25-31	6.6	"	2.0	71	497	
Nov. '42	1-8	9.3	"	2.0	101	808	17,051
	9-15	16.8	"	13.5	1,230	8,610	
	16-23	10.9	"	1.5	885	7,080	
	24-30	9.7	"	1.5	79	553	
Dec. '42	1-8	8.6	"	1.5	70	560	2,637
	9-16	8.0	"	2.0	86	688	
	17-24	7.3	"	1.5	59	472	
	25-31	12.1	"	2.0	131	917	
Jan. '43	1-8	7.8	"	2.5	105	840	2,628
	9-16	7.9	"	1.5	64	512	
	17-24	7.9	"	2.0	86	688	
	25-31	7.8	"	2.0	84	588	
Feb. '43	1-7	7.6	"	1.5	62	434	45,010
	8-14	7.3	"	3.5	138	966	
	15-21	12.6	"	2.5	170	1,190	
	22-28	53.4	"	21.0	6,060	42,420	
Mar. '43	1-8	18.3	"	3.0	297	2,375	96,324
	9-16	110.0	"	8.5	5,060	40,500	
	17-24	80.0	"	14.0	6,060	48,500	
	25-31	29.1	"	4.5	707	4,949	
Apr. '43	1-8	19.0	"	7.5	770	6,160	15,910
	9-15	16.9	"	4.0	366	2,560	
	16-23	18.1	"	5.0	490	3,920	
	24-30	14.4	"	6.0	468	3,270	
May '43	1-8	12.1	"	4.0	262	2,095	25,730
	9-16	10.1	"	3.5	192	1,535	
	17-24	11.1	"	25.0	1,490	11,900	
	25-31	10.8	"	25.0	1,460	10,200	
June '43	1-8	21.9	"	16.0	1,895	15,150	20,890
	9-15	10.5	"	5.0	284	1,985	
	16-23	11.2	"	5.0	303	2,420	
	24-30	17.6	"	2.0	191	1,335	

KT-2 DOOR CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Org.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	5.6	5.41	.51	15	120	424
	9-16	7.0	"	.49	19	152	
	17-24	6.6	"	.35	12	96	
	25-31	5.6	"	.25	8	56	
Aug. '42	1-8	8.6	"	.29	13	104	251
	9-16	5.2	"	.30	8	64	
	17-24	4.4	"	.25	6	48	
	25-31	4.1	"	.23	5	35	
Sept. '42	1-8	5.5	"	.22	7	56	654
	9-15	6.7	"	.27	10	70	
	16-23	10.9	"	.89	52	416	
	24-30	7.5	"	.40	16	112	
Oct. '42	1-8	6.3	"	.35	12	96	295
	9-16	6.0	"	.29	9	72	
	17-24	5.4	"	.27	8	64	
	25-31	6.6	"	.24	9	63	
Nov. '42	1-8	9.3	"	.54	27	216	2,135
	9-15	16.8	"	1.70	155	1,085	
	16-23	10.9	"	1.20	71	568	
	24-30	9.7	"	.73	38	266	
Dec. '42	1-8	8.6	"	.38	18	144	553
	9-16	8.0	"	.31	13	104	
	17-24	7.3	"	.27	11	88	
	25-31	12.1	"	.48	31	217	
Jan. '43	1-8	7.8	"	.69	29	232	648
	9-16	7.9	"	.53	23	184	
	17-24	7.9	"	.34	15	120	
	25-31	7.8	"	.37	16	112	
Feb. '43	1-7	7.6	"	.40	16	112	6,715
	8-14	7.3	"	.65	26	182	
	15-21	12.6	"	.34	23	161	
	22-28	53.4	"	3.10	895	6,260	
Mar. '43	1-8	18.3	"	.77	76	608	20,098
	9-16	110.0	"	1.80	1,070	8,560	
	17-24	80.0	"	2.80	1,210	9,680	
	25-31	29.1	"	1.14	179	1,250	
Apr. '43	1-8	19.0	"	1.10	113	904	2,627
	9-15	16.9	"	.92	84	588	
	16-23	18.1	"	.87	85	680	
	24-30	14.4	"	.83	65	455	
May '43	1-8	12.1	"	.60	39	312	1,406
	9-16	10.1	"	.41	22	176	
	17-24	11.1	"	.84	50	400	
	25-31	10.8	"	1.27	74	518	
June '43	1-8	21.9	"	1.67	198	1,535	2,303
	8-15	10.5	"	.47	27	189	
	16-23	11.2	"	.53	32	256	
	24-30	17.6	"	.41	39	273	

KT-3

WILLIAMS CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Inorg.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.7	5.41	1.65	6.2	50	134
	9-16	1.1	"	1.65	9.8	78	
	17-24	0.8	"	.10	0.4	3	
	25-31	0.6	"	.12	0.4	3	
Aug. '42	1-8	1.4	"	.12	0.9	7	13
	9-16	0.6	"	.10	0.3	2	
	17-24	0.5	"	.13	0.4	3	
	25-31	0.4	"	.11	0.2	1	
Sept. '42	1-8	1.2	"	.14	0.9	7	209
	9-15	1.8	"	.20	1.9	13	
	16-23	2.0	"	1.85	20.0	160	
	24-30	0.8	"	.97	4.2	29	
Oct. '42	1-8	1.5	"	.41	3.3	26	118
	9-16	1.1	"	.32	1.9	15	
	17-24	1.0	"	.33	1.8	14	
	25-31	1.9	"	.88	9.0	63	
Nov. '42	1-8	1.5	"	1.75	14.2	114	1,176
	9-15	2.0	"	8.10	87.5	612	
	16-23	1.2	"	5.12	33.3	266	
	24-30	0.8	"	6.07	26.3	184	
Dec. '42	1-8	0.8	"	3.68	15.9	127	665
	9-16	0.8	"	3.24	14.0	112	
	17-24	0.7	"	3.31	12.5	100	
	25-31	2.0	"	4.30	46.5	326	
Jan. '43	1-8	1.0	"	5.29	28.6	229	550
	9-16	0.7	"	3.83	14.5	116	
	17-24	0.7	"	3.61	13.7	109	
	25-31	0.7	"	3.61	13.7	96	
Feb. '43	1-7	0.7	"	3.09	11.7	82	2,464
	8-14	0.8	"	3.16	13.7	96	
	15-21	2.6	"	3.17	44.5	311	
	22-28	8.5	"	6.13	282.0	1,975	
Mar. '43	1-8	2.7	"	4.77	69.7	557	9,199
	9-16	12.4	"	6.98	468.0	3,740	
	17-24	10.5	"	9.19	521.0	4,160	
	25-31	2.9	"	6.75	106.0	742	
Apr. '43	1-8	1.4	"	7.98	60.4	483	1,125
	9-15	1.2	"	4.65	30.2	211	
	16-23	1.4	"	4.34	32.8	263	
	24-30	1.1	"	4.03	24.0	168	
May '43	1-8	0.9	"	3.48	16.9	135	520
	9-16	0.8	"	3.46	14.9	119	
	17-24	0.9	"	3.30	16.1	129	
	25-31	1.1	"	3.30	19.6	137	
June '43	1-8	1.0	"	2.78	15.0	120	434
	9-15	0.9	"	3.04	14.8	103	
	16-23	0.8	"	2.42	10.5	84	
	24-30	1.1	"	3.06	18.2	127	

KT-3

WILLIAMS CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Sol.P. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.7	5.41	.28	1.1	8.8	37.4*
	9-16	1.1	"	.28	1.7	13.6	
	17-24	0.8	"	.24	1.0	8.0	
	25-31	0.6	"	.33	1.0	7.0	
Aug. '42	1-8	1.4	"	.36	2.7	21.6	37.7*
	9-16	0.6	"	.26	0.8	6.4	
	17-24	0.5	"	.22	0.6	4.8	
	25-31	0.4	"	.34	0.7	4.9	
Sept. '42	1-8	1.2	"	.21	1.4	11.2	45.7*
	9-15	1.8	"	.22	2.1	14.7	
	16-23	2.0	"	.21	2.3	18.4	
	24-30	0.8	"	.04	0.2	1.4	
Oct. '42	1-8	1.5	"	.06	0.5	4.0	7.1
	9-16	1.1	"	.04	0.2	1.6	
	17-24	1.0	"	.025	0.1	0.8	
	24-31	1.9	"	.01	0.1	0.7	
Nov. '42	1-8	1.5	"	.04	0.3	2.4	12.3
	9-15	2.0	"	.11	1.2	8.4	
	16-23	1.2	"	.02	0.1	0.8	
	24-30	0.8	"	.02	0.1	0.7	
Dec. '42	1-8	0.8	"	.02	0.1	0.8	9.4
	9-16	0.8	"	.03	0.1	0.8	
	17-24	0.7	"	.02	0.8	6.4	
	25-31	2.0	"	.02	0.2	1.4	
Jan. '43	1-8	1.0	"	.02	0.1	0.8	12.8
	9-16	0.7	"	.01	0.4	3.2	
	17-24	0.7	"	.01	0.4	3.2	
	25-31	0.7	"	.02	0.8	5.6	
Feb. '43	1-7	0.7	"	.03	1.1	7.7	25.2
	8-14	0.8	"	.01	0.1	0.7	
	15-21	2.6	"	.01	0.1	0.7	
	22-28	8.5	"	.05	2.3	16.1	
Mar. '43	1-8	2.7	"	.015	0.2	1.6	45.1
	9-1	12.4	"	.04	2.7	21.6	
	17-24	10.5	"	.04	2.3	18.4	
	25-31	2.9	"	.03	0.5	3.5	
Apr. '43	1-8	1.4	"	.02	0.2	1.6	4.5
	9-15	1.2	"	.01	0.1	0.7	
	16-23	1.4	"	.01	0.1	0.8	
	24-30	1.1	"	.03	0.2	1.4	
May '43	1-8	0.9	"	.01	0.1	0.8	3.1
	9-16	0.8	"	.03	0.1	0.8	
	17-24	0.9	"	.03	0.1	0.8	
	25-31	1.1	"	.02	0.1	0.7	
June '43	1-8	1.0	"	.05	0.3	2.4	6.8
	9-15	0.9	"	.05	0.2	1.4	
	16-23	0.8	"	.05	0.2	1.6	
	24-30	1.1	"	.03	0.2	1.4	

*Values believed to have been influenced by invasion of lake water.

KT-3 WILLIAMS CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Vol.S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.7	5.41	3.5	13	104	525
	9-16	1.1	"	3.5	21	168	
	17-24	0.8	"	5.0	22	176	
	25-31	0.6	"	3.5	11	77	
Aug. '42	1-8	1.4	"	3.0	23	184	861
	9-16	0.6	"	21.0	68	544	
	17-24	0.5	"	2.5	7	56	
	25-31	0.4	"	5.3	11	77	
Sept. '42	1-8	1.2	"	6.0	39	312	1,054
	9-15	1.8	"	4.0	39	273	
	16-23	2.0	"	4.5	49	392	
	24-30	0.8	"	2.5	11	77	
Oct. '42	1-8	1.5	"	3.0	24	192	619
	9-16	1.1	"	3.5	21	168	
	17-24	1.0	"	2.5	14	112	
	25-30	1.9	"	2.0	21	147	
Nov. '42	1-8	1.5	"	3.5	28	224	1,124
	9-15	2.0	"	6.5	70	490	
	16-23	1.2	"	5.0	32	256	
	24-30	0.8	"	5.0	22	154	
Dec. '43	1-8	0.8	"	5.5	24	192	714
	9-16	0.8	"	4.5	19	152	
	17-24	0.7	"	3.5	13	104	
	25-31	2.0	"	3.5	38	266	
Jan. '43	1-8	1.0	"	3.5	19	152	455
	9-16	0.7	"	1.5	6	48	
	17-24	0.7	"	4.5	17	136	
	25-31	0.7	"	4.5	17	119	
Feb. '43	1-7	0.7	"	2.5	9	63	3,983
	8-14	0.8	"	3.0	13	91	
	15-21	2.6	"	3.0	42	294	
	22-28	8.5	"	11.0	505	3,535	
Mar. '43	1-8	2.7	"	8.0	117	936	5,697
	9-16	12.4	"	5.5	370	2,960	
	17-24	10.5	"	3.0	170	1,360	
	25-30	2.9	"	4.0	63	441	
Apr. '43	1-8	1.4	"	3.5	27	216	733
	9-15	1.2	"	2.5	16	112	
	16-23	1.4	"	3.5	27	216	
	24-30	1.1	"	4.5	27	189	
May '43	1-8	0.9	"	5.0	24	192	997
	9-16	0.8	"	3.5	15	120	
	17-24	0.9	"	8.5	41	328	
	25-31	1.1	"	8.5	51	357	
June '43	1-8	1.0	"	3.0	16	128	591
	9-15	0.9	"	3.5	17	119	
	16-23	0.8	"	5.0	22	176	
	24-30	1.1	"	4.0	24	168	

KT-3 WILLIAMS CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Org.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.7	5.41	.41	2	16	62
	9-16	1.1	"	.41	2	16	
	17-24	0.8	"	.37	2	16	
	25-31	0.6	"	.31	1	14	
Aug. '42	1-8	1.4	"	.41	3	24	55
	9-16	0.6	"	.47	2	16	
	17-24	0.5	"	.34	1	8	
	25-31	0.4	"	.39	1	7	
Sept. '42	1-8	1.2	"	.36	2	16	130
	9-15	1.8	"	.44	4	28	
	16-23	2.0	"	.84	9	72	
	24-30	0.8	"	.45	2	14	
Oct. '42	1-8	1.5	"	.38	3	24	85
	9-16	1.1	"	.49	3	24	
	17-24	1.0	"	.35	2	16	
	25-31	1.9	"	.34	3	21	
Nov. '42	1-8	1.5	"	2.10	17	136	296
	9-15	2.0	"	1.30	14	98	
	16-23	1.2	"	1.00	6	48	
	24-30	0.8	"	.56	2	14	
Dec. '42	1-8	0.8	"	.36	2	16	60
	9-16	0.8	"	.32	1	8	
	17-24	0.7	"	.31	1	8	
	25-31	2.0	"	.40	4	28	
Jan. '43	1-8	1.0	"	.49	3	24	47
	9-16	0.7	"	.33	1	8	
	17-24	0.7	"	.27	1	8	
	25-31	0.7	"	.29	1	7	
Feb. '43	1-7	0.7	"	.31	1	7	616
	8-14	0.8	"	.27	1	7	
	15-21	2.6	"	.24	3	21	
	22-28	8.5	"	1.80	83	581	
Mar. '43	1-8	2.7	"	.57	8	64	789
	9-16	12.4	"	.63	42	336	
	17-24	10.5	"	.68	39	312	
	25-31	2.9	"	.73	11	77	
Apr. '43	1-8	1.4	"	.70	5	40	114
	9-15	1.2	"	.42	3	21	
	16-23	1.4	"	.47	4	32	
	24-30	1.1	"	.51	3	21	
May '43	1-8	0.9	"	.31	2	16	61
	9-16	0.8	"	.27	1	8	
	17-24	0.9	"	.40	2	16	
	25-31	1.1	"	.52	3	21	
June '43	1-8	1.0	"	.40	2	16	52
	9-15	0.9	"	.35	2	14	
	16-23	0.8	"	.29	1	8	
	24-30	1.1	"	.31	2	14	

KT-4 **HALVERSONS CREEK** 164<

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Inorg.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.8	5.41	4.55	20	160	567
	9-16	1.1	"	4.55	27	216	
	17-24	0.8	"	3.80	16	128	
	25-31	0.6	"	2.74	9	63	
Aug. '42	1-8	1.5	"	2.60	21	168	330
	9-16	0.6	"	2.69	9	72	
	17-24	0.5	"	2.12	6	48	
	25-31	0.5	"	2.30	6	42	
Sept. '42	1-8	1.2	"	2.60	17	136	485
	9-15	1.5	"	1.01	8	56	
	16-23	1.8	"	2.73	27	216	
	24-30	0.6	"	3.26	11	77	
Oct. '42	1-8	0.7	"	4.07	15	120	665
	9-16	0.9	"	3.23	16	128	
	17-24	1.0	"	3.27	18	144	
	25-31	2.2	"	3.26	39	273	
Nov. '42	1-8	2.3	"	3.06	38	304	2,275
	9-15	3.8	"	5.71	117	820	
	16-23	3.6	"	5.55	108	864	
	24-30	2.5	"	3.05	41	287	
Dec. '42	1-8	2.0	"	2.91	31	248	1,304
	9-16	2.2	"	3.10	37	296	
	17-24	2.6	"	2.76	39	312	
	25-31	4.1	"	2.90	64	448	
Jan. '43	1-8	2.7	"	3.04	44	352	1,204
	9-16	2.1	"	3.[illegible]3	39	312	
	17-24	2.0	"	3.30	36	288	
	25-31	2.0	"	3.30	36	252	
Feb. '43	1-7	3.1	"	3.13	52	364	1,603
	8-14	2.2	"	2.92	35	245	
	15-21	4.0	"	3.07	66	462	
	22-28	6.4	"	2.19	76	532	
Mar. '43	1-8	3.0	"	3.52	57	456	3,266
	9-16	12.4	"	2.82	189	1,510	
	17-24	10.8	"	2.12	124	992	
	25-31	3.1	"	2.62	44	308	
Apr. '43	1-8	1.4	"	2.17	16	128	585
	9-15	1.2	"	3.17	21	147	
	16-23	1.4	"	3.00	23	184	
	24-30	1.2	"	2.82	18	126	
May '43	1-8	0.9	"	2.98	14	112	432
	9-16	0.8	"	2.77	12	96	
	17-24	0.9	"	2.88	14	112	
	25-31	1.0	"	2.88	16	112	
June '43	1-8	1.0	"	2.53	14	112	394
	9-15	0.9	"	2.89	14	98	
	16-23	0.8	"	2.01	9	72	
	24-30	1.0	"	2.87	16	112	

KT-4

HALVERSONS CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Sol.P. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.8	5.41	.12	0.5	4.0	12.6
	9-16	1.1	"	.12	0.7	5.6	
	17-24	0.8	"	.04	0.2	1.6	
	25-31	0.6	"	.07	0.2	1.4	
Aug. '42	1-8	1.5	"	.17	1.4	11.2	13.5
	9-16	0.6	"	.03	0.1	0.8	
	17-24	0.5	"	.025	0.1	0.8	
	25-31	0.5	"	.018	0.1	0.7	
Sept. '42	1-8	1.2	"	.16	1.0	8.0	21.7
	9-15	1.5	"	.17	1.4	9.8	
	16-23	1.8	"	.04	0.4	3.2	
	24-30	0.6	"	.04	0.1	0.7	
Oct. '42	1-8	0.7	"	.06	0.2	1.6	6.8
	9-16	0.9	"	.03	0.1	0.8	
	17-24	1.0	"	.03	0.2	1.6	
	25-31	2.2	"	.03	0.4	2.8	
Nov. '42	1-8	2.3	"	.03	0.4	3.2	49.9
	9-15	3.8	"	.28	5.8	40.6	
	16-23	3.6	"	.025	0.5	4.0	
	24-30	2.5	"	.025	0.3	2.1	
Dec. '42	1-8	2.0	"	.035	0.4	3.2	12.4
	9-16	2.2	"	.045	0.5	4.0	
	17-24	2.6	"	.020	0.3	2.4	
	25-31	4.1	"	.020	0.4	2.8	
Jan. '43	1-8	2.7	"	.03	0.4	3.2	10.1
	9-16	2.1	"	.03	0.3	2.4	
	17-24	2.0	"	.03	0.3	2.4	
	25-31	2.0	"	.03	0.3	2.1	
Feb. '43	1-7	3.1	"	.045	0.8	5.6	19.6
	8-14	2.2	"	.02	0.2	1.4	
	15-21	4.0	"	.02	0.4	2.8	
	22-28	6.4	"	.04	1.4	9.8	
Mar. '43	1-8	3.0	"	.025	0.4	3.2	46.0
	9-16	12.4	"	.04	2.7	21.6	
	17-24	10.8	"	.04	2.3	18.4	
	25-31	3.1	"	.025	0.4	2.8	
Apr. '43	1-8	1.4	"	.035	0.3	2.4	6.0
	9-15	1.2	"	.01	0.1	0.7	
	16-23	1.4	"	.01	0.1	0.8	
	24-30	1.2	"	.04	0.3	2.1	
May '43	1-8	0.9	"	.01	0.1	0.8	3.8
	9-16	0.8	"	.02	0.1	0.8	
	17-24	0.9	"	.02	0.1	0.8	
	25-31	1.0	"	.035	0.2	1.4	
June '43	1-8	1.0	"	.06	0.3	2.4	6.8
	9-15	0.9	"	.06	0.3	2.1	
	16-23	0.8	"	.04	0.2	1.6	
	24-30	1.0	"	.025	0.1	0.7	

KT-4

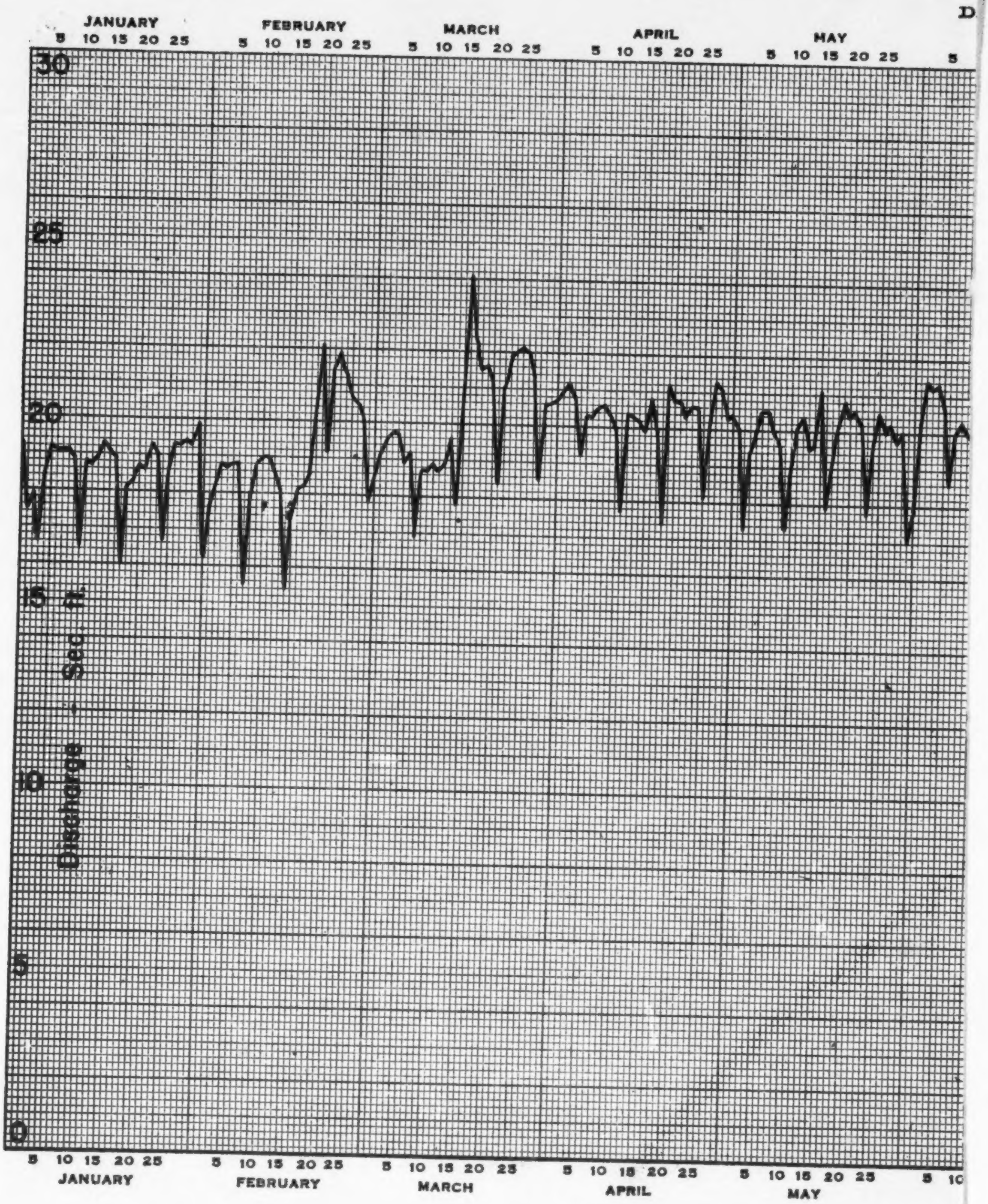
166< HALVERSONS CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Vol. S.S. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.8	5.41	4.5	19	152	632
	9-16	1.1	"	4.5	27	216	
	17-24	0.8	"	4.5	19	152	
	25-31	0.6	"	5.0	16	112	
Aug. '42	1-8	1.5	"	2.5	20	160	368
	9-16	0.6	"	4.5	15	120	
	17-24	0.5	"	1.5	4	32	
	25-31	0.5	"	2.8	8	56	
Sept. '42	1-8	1.2	"	4.0	26	208	2,528
	9-15	1.5	"	31.0	251	1,755	
	16-23	1.8	"	7.0	68	544	
	24-30	0.6	"	1.0	3	21	
Oct. '42	1-8	0.7	"	2.5	9	72	326
	9-16	0.9	"	0.5	2	16	
	17-24	1.0	"	2.5	14	112	
	25-31	2.2	"	1.5	18	126	
Nov. '42	1-8	2.3	"	1.5	19	152	1,710
	9-15	3.8	"	8.0	164	1,148	
	16-23	3.6	"	2.0	39	312	
	24-30	2.5	"	1.0	14	98	
Dec. '42	1-8	2.0	"	0.5	5	40	395
	9-16	2.2	"	1.0	12	96	
	17-24	2.6	"	0.5	7	56	
	25-31	4.1	"	1.3	29	203	
Jan. '43	1-8	2.7	"	2.0	29	232	850
	9-16	2.1	"	0.5	6	48	
	17-24	2.0	"	3.5	38	304	
	25-31	2.0	"	3.5	38	266	
Feb. '43	1-7	3.1	"	5.5	92	644	4,795
	8-14	2.2	"	10.0	119	833	
	15-21	4.0	"	7.5	162	1,134	
	22-28	6.4	"	9.0	312	2,184	
Mar. '43	1-8	3.0	"	2.0	32	256	5,279
	9-16	12.4	"	3.8	255	2,040	
	17-24	10.8	"	5.5	321	2,570	
	25-31	3.1	"	3.5	59	413	
Apr. '43	1-8	1.4	"	5.5	42	336	1,014
	9-15	1.2	"	2.5	16	112	
	16-23	1.4	"	4.5	34	272	
	24-30	1.2	"	6.5	42	294	
May '43	1-8	0.9	"	5.0	24	192	800
	9-16	0.8	"	4.5	19	152	
	17-24	0.9	"	6.0	29	232	
	25-31	1.0	"	6.0	32	224	
June '43	1-8	1.0	"	8.5	46	368	1,421
	9-15	0.9	"	19.0	93	651	
	16-23	0.8	"	4.0	17	136	
	24-30	1.0	"	7.0	38	266	

KT-4 **167<** HALVERSONS CREEK

Month	Period	Avg.Flow C.F.S.	Factor	Avg.Conc. Org.N. P.P.M.	Lbs.Per Day	Lbs.Per Period	Total Lbs. Per Month
July '42	1-8	0.8	5.41	.40	2	16	47
	9-16	1.1	"	.40	2	16	
	17-24	0.8	"	.25	1	8	
	25-31	0.6	"	.17	1	7	
Aug. '42	1-8	1.5	"	.34	3	24	47
	9-16	0.6	"	.20	1	8	
	17-24	0.5	"	.19	1	8	
	25-31	0.5	"	.19	1	7	
Sept. '42	1-8	1.2	"	.41	3	24	165
	9-15	1.5	"	1.22	10	70	
	16-23	1.8	"	.87	8	64	
	24-30	0.6	"	.16	1	7	
Oct. '42	1-8	0.7	"	.18	1	8	38
	9-16	0.9	"	.16	1	8	
	17-24	1.0	"	.22	1	8	
	25-31	2.2	"	.20	2	14	
Nov. '42	1-8	2.3	"	.23	3	24	175
	9-15	3.8	"	.68	14	98	
	16-23	3.6	"	.20	4	32	
	24-30	2.5	"	.21	3	21	
Dec. '42	1-8	2.0	"	.11	1	8	68
	9-16	2.2	"	.17	2	16	
	17-24	2.6	"	.15	2	16	
	25-31	4.1	"	.19	4	28	
Jan. '43	1-8	2.7	"	.23	3	24	77
	9-16	2.1	"	.20	2	16	
	17-24	2.0	"	.22	2	16	
	25-31	2.0	"	.28	3	21	
Feb. '43	1-7	3.1	"	.35	6	42	399
	8-14	2.2	"	.52	6	42	
	15-21	4.0	"	.40	9	63	
	22-28	6.4	"	1.05	36	252	
Mar. '43	1-8	3.0	"	.12	2	16	562
	9-16	12.4	"	.55	37	296	
	17-24	10.8	"	.45	26	208	
	25-31	3.1	"	.36	6	42	
Apr. '43	1-8	1.4	"	.42	3	24	61
	9-15	1.2	"	.20	1	7	
	16-23	1.4	"	.28	2	16	
	24-30	1.2	"	.36	2	14	
May '43	1-8	0.9	"	.28	1	8	46
	9-16	0.8	"	.28	1	8	
	17-24	0.9	"	.32	2	16	
	25-31	1.0	"	.46	2	14	
June '43	1-8	1.0	"	.60	3	24	74
	9-15	0.9	"	.86	4	28	
	16-23	0.8	"	.25	1	8	
	24-30	1.0	"	.35	2	14	

NINE SPRINGS



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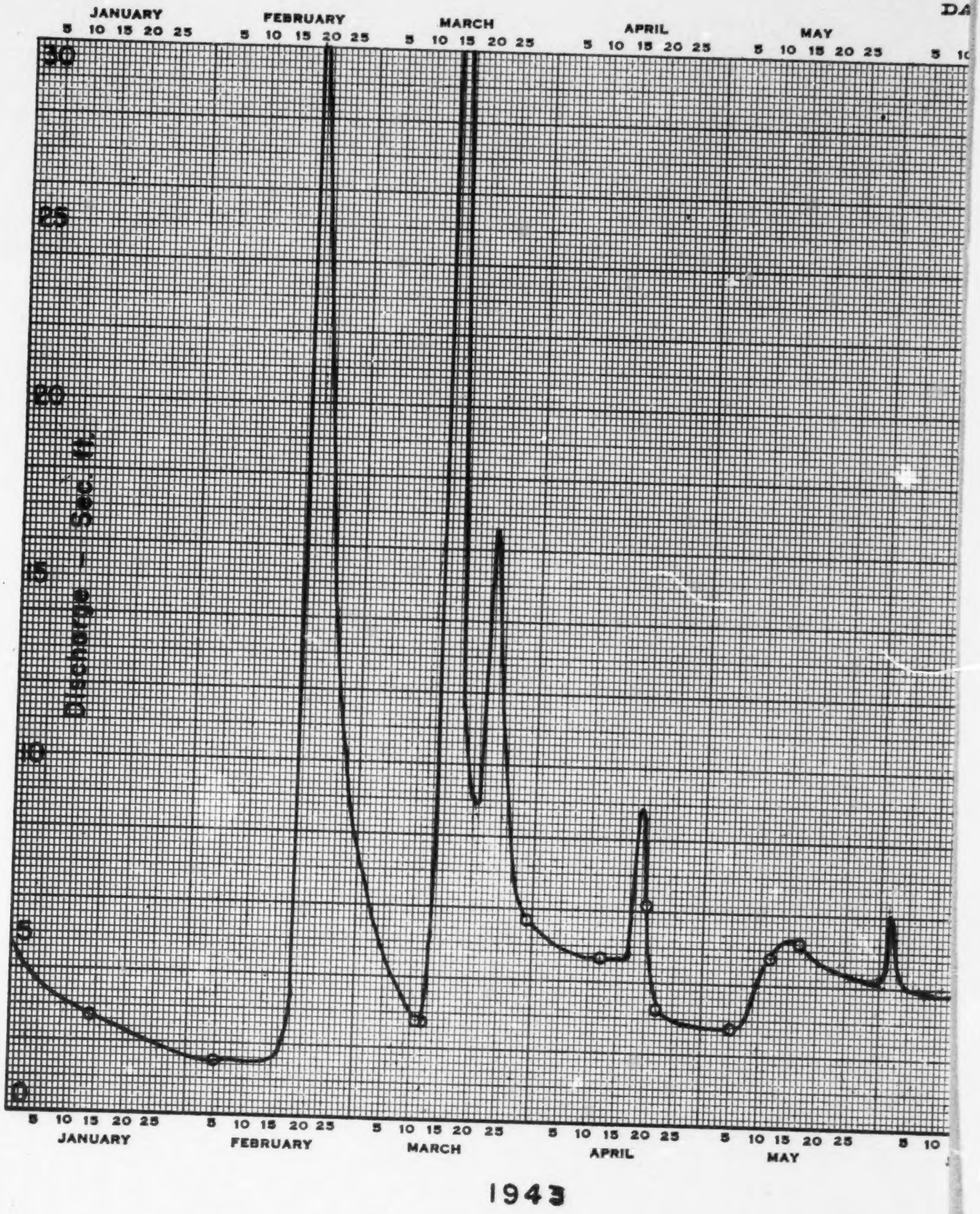

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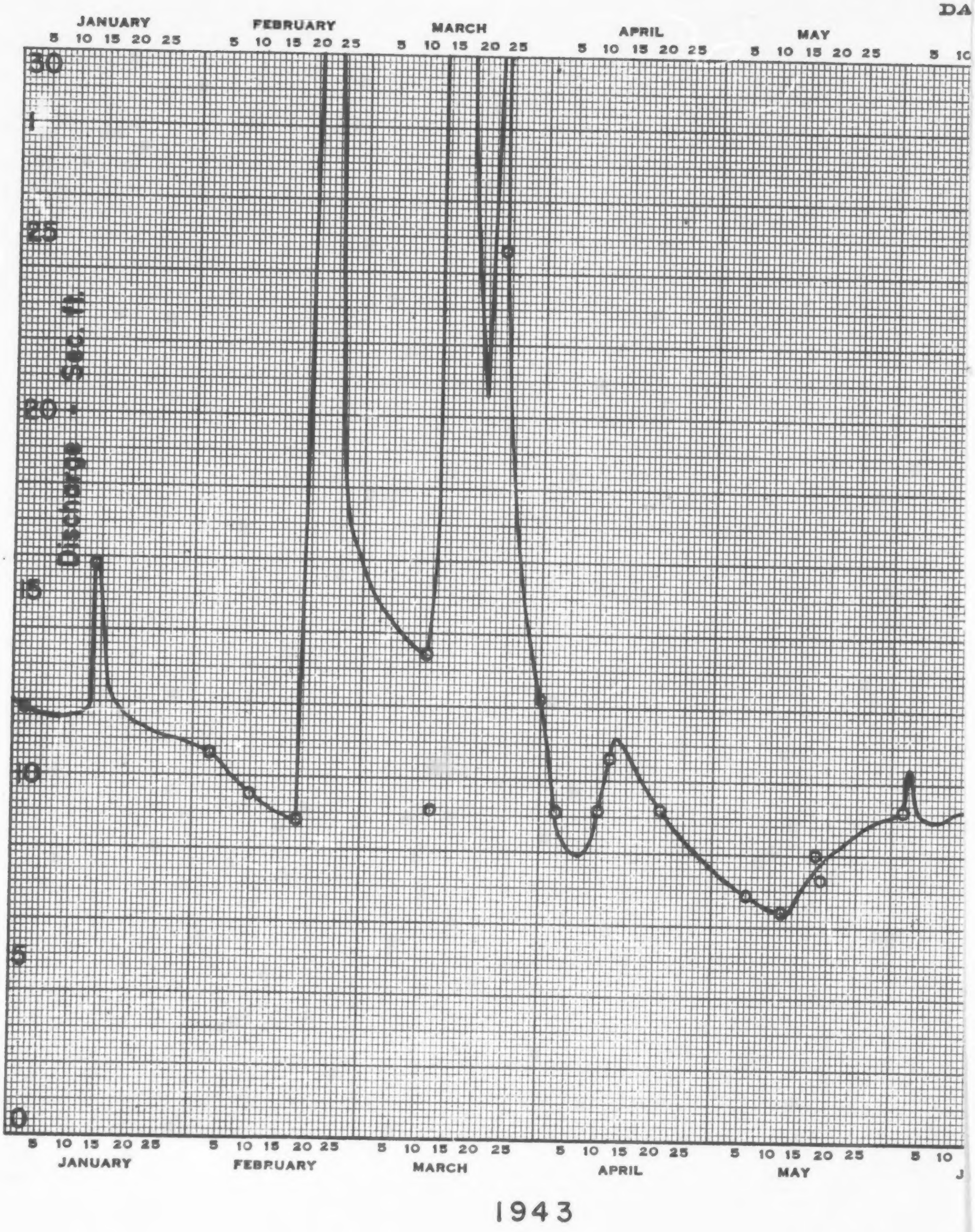
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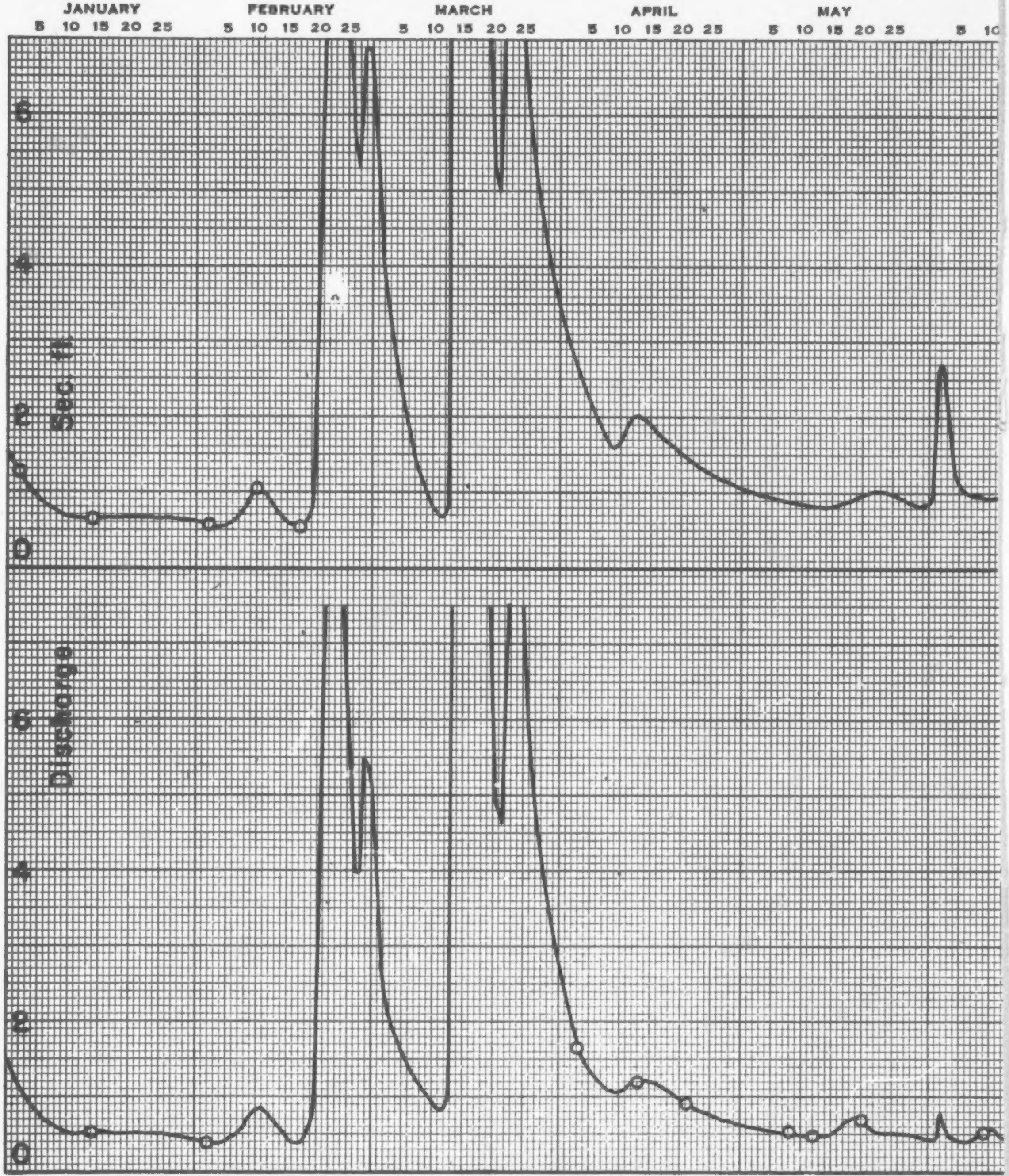

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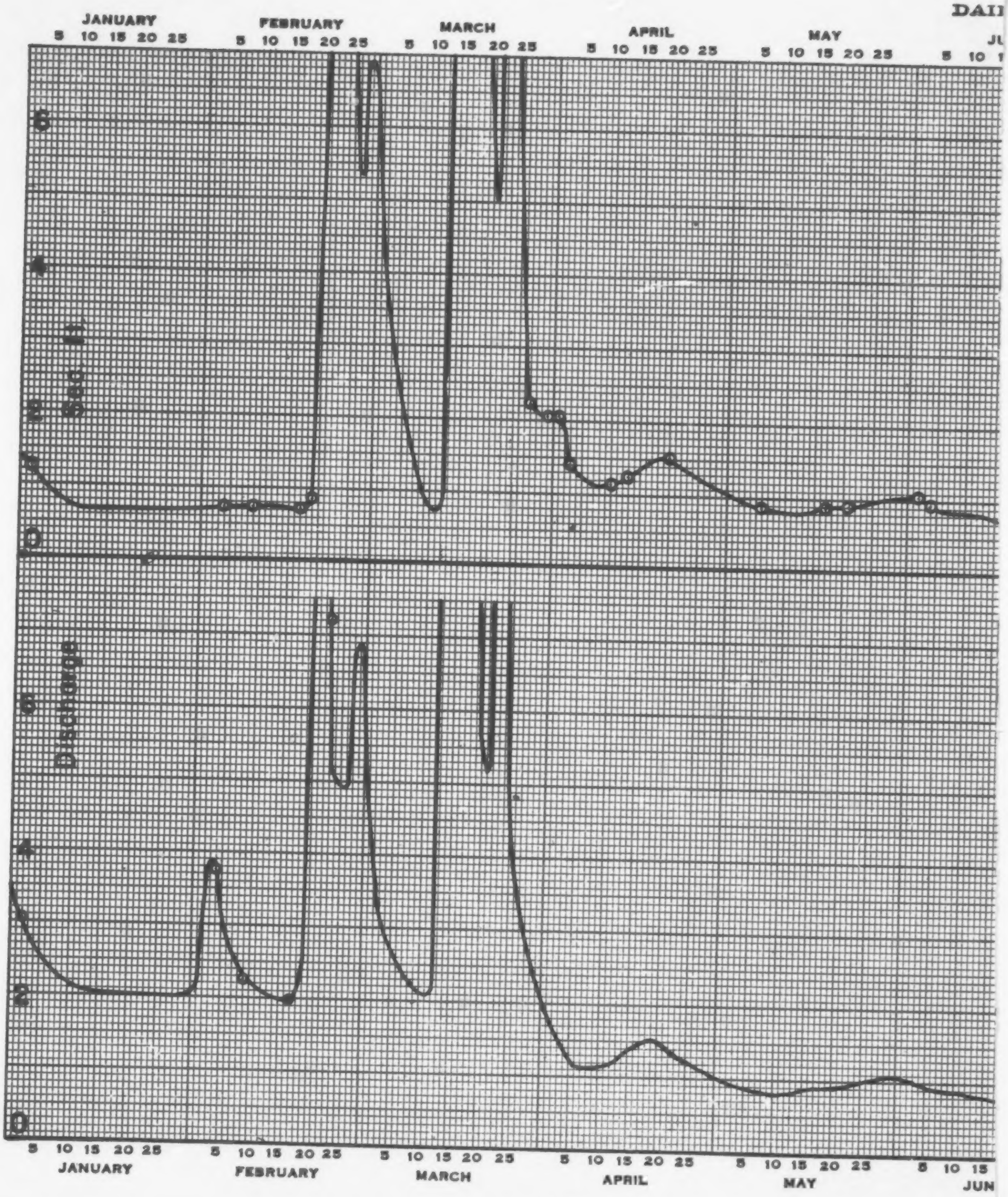

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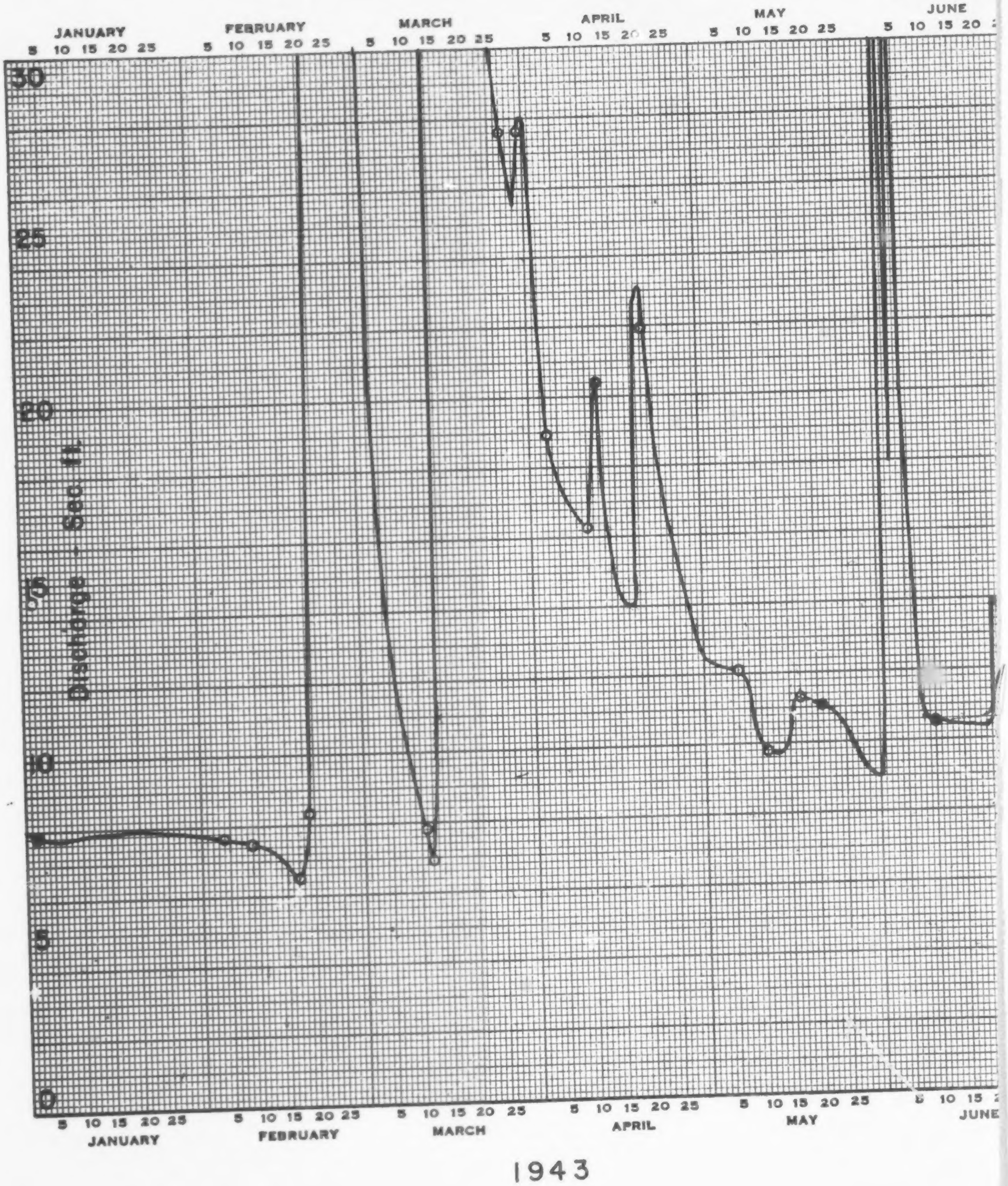

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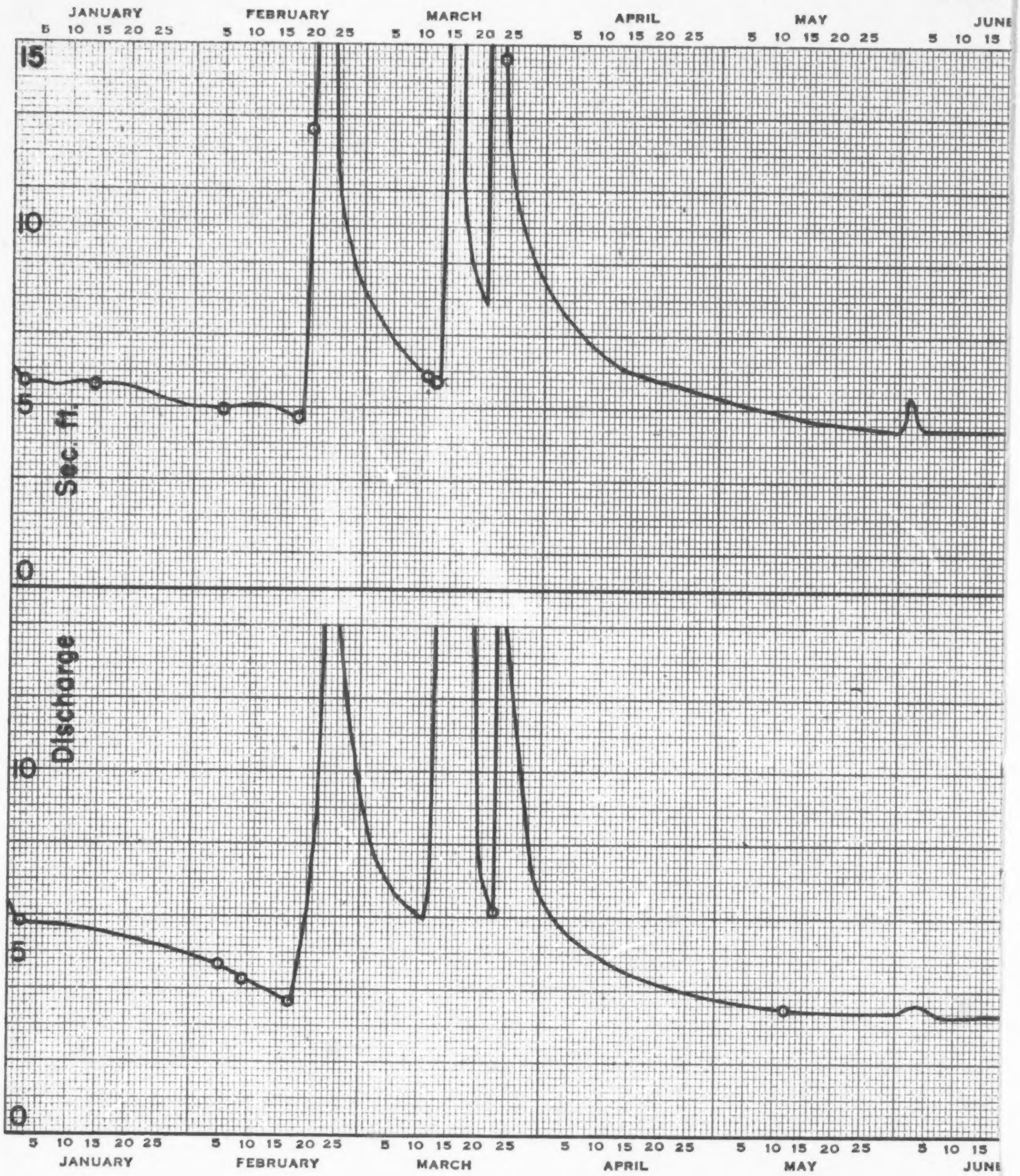

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YAHARA

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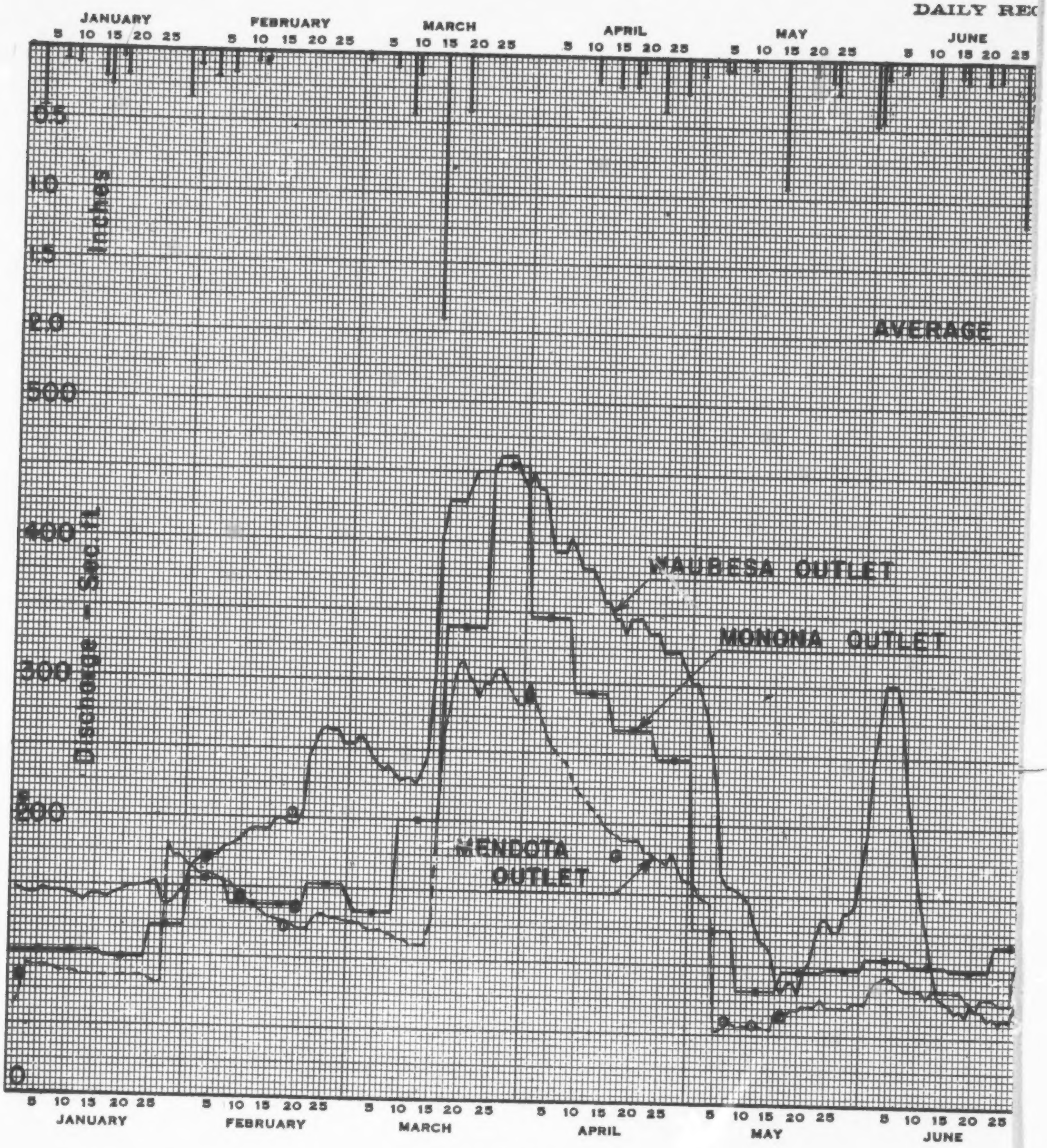

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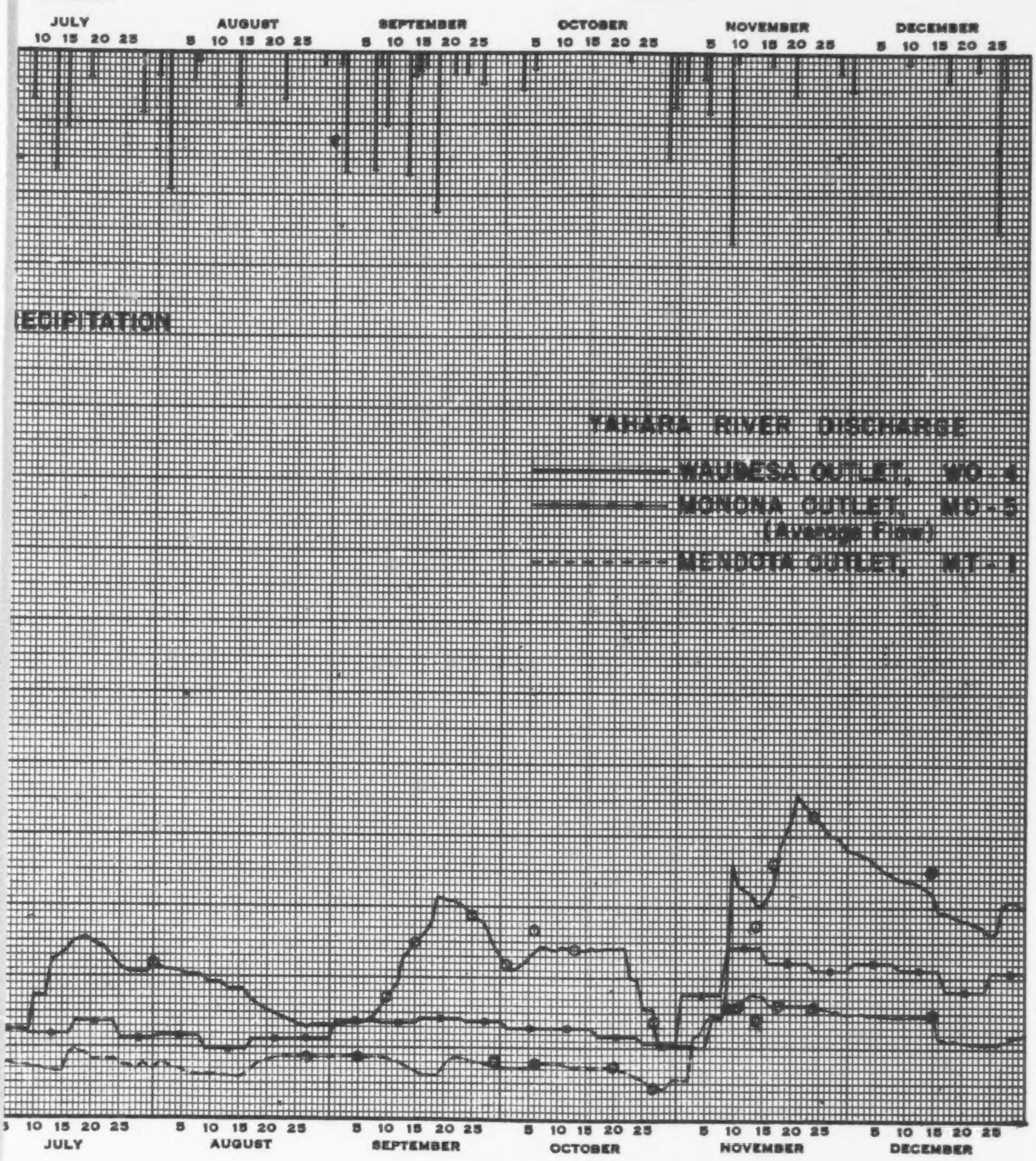

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CREEK, MT-2E
EEK, MT-3

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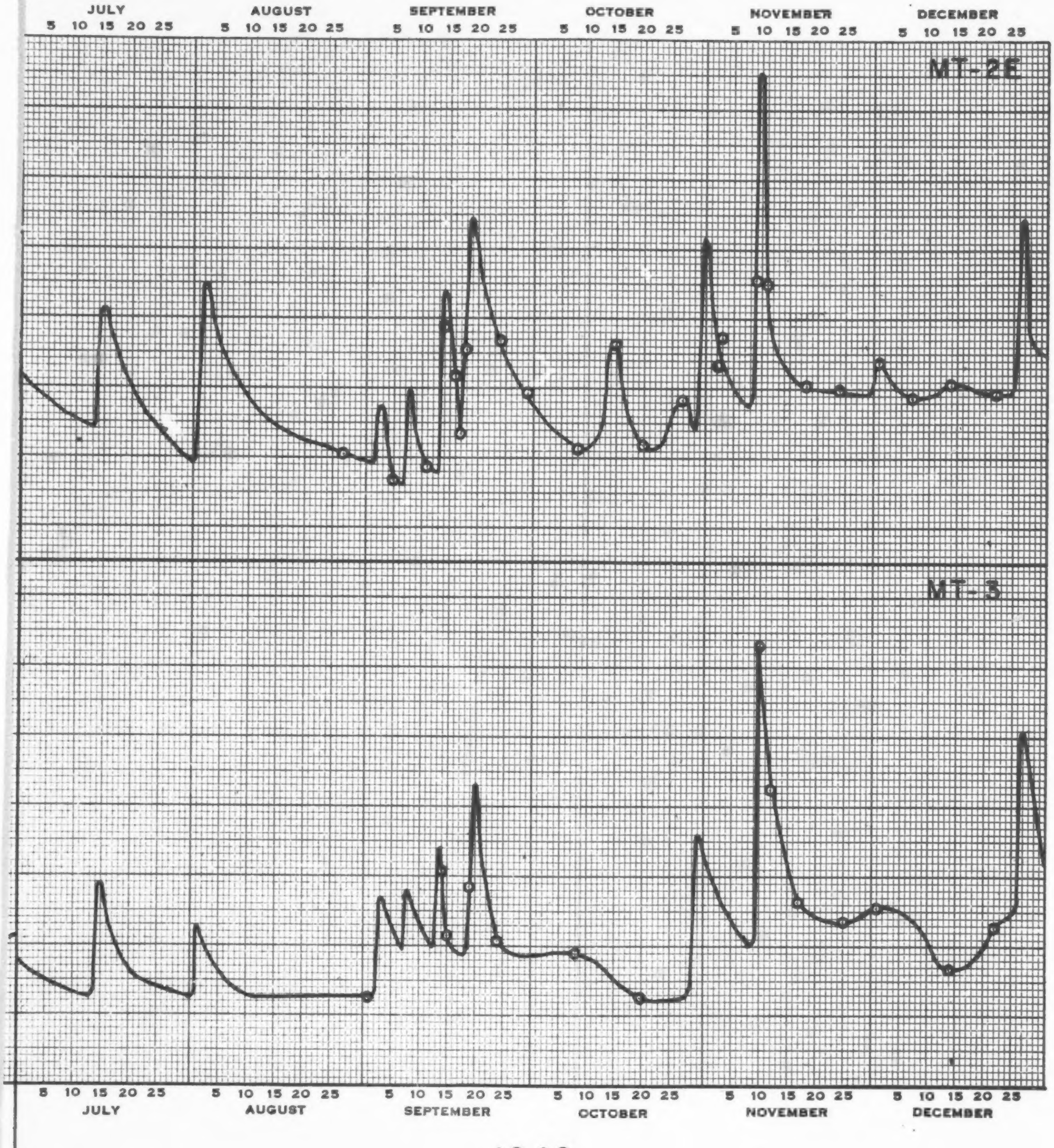

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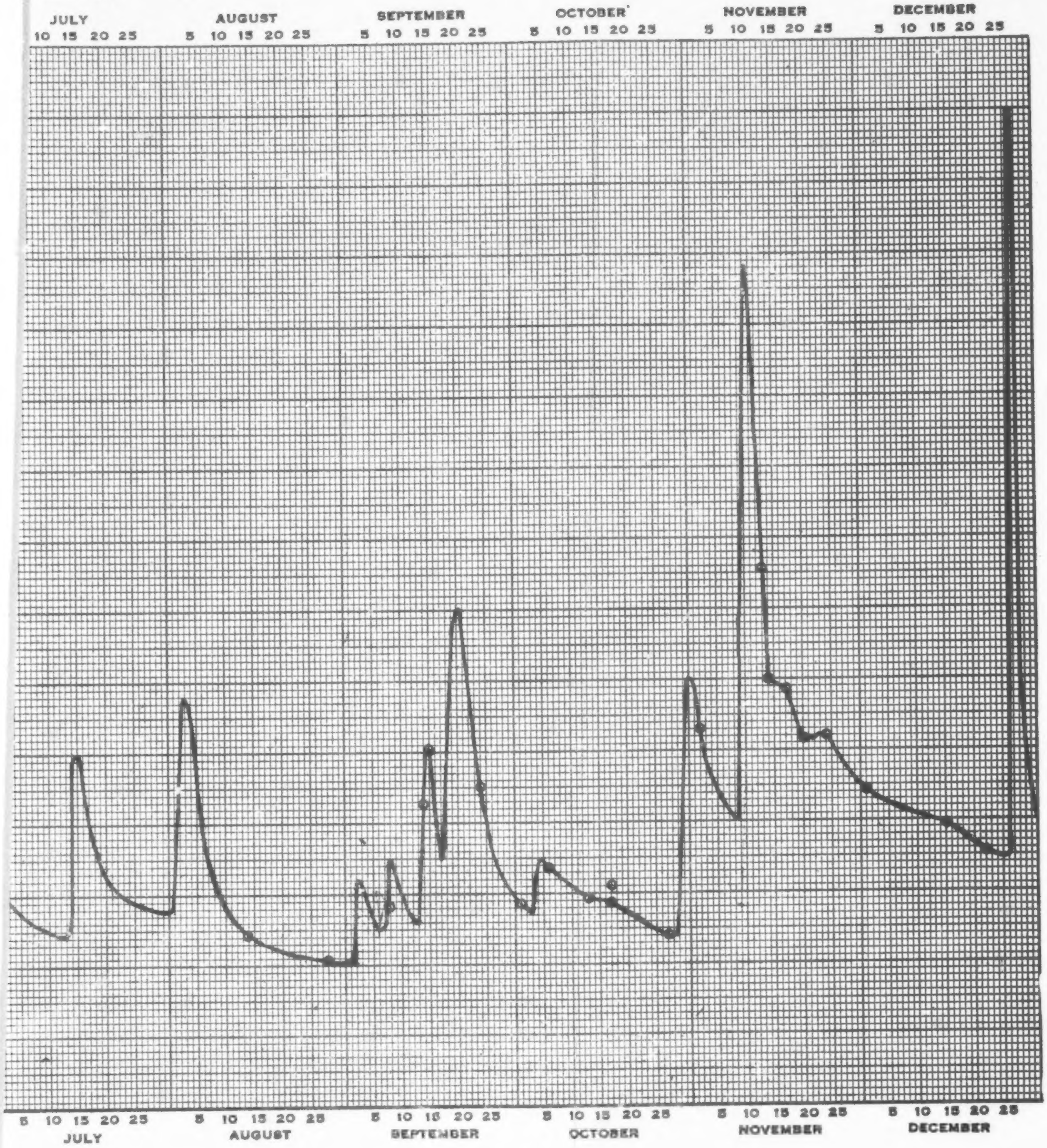

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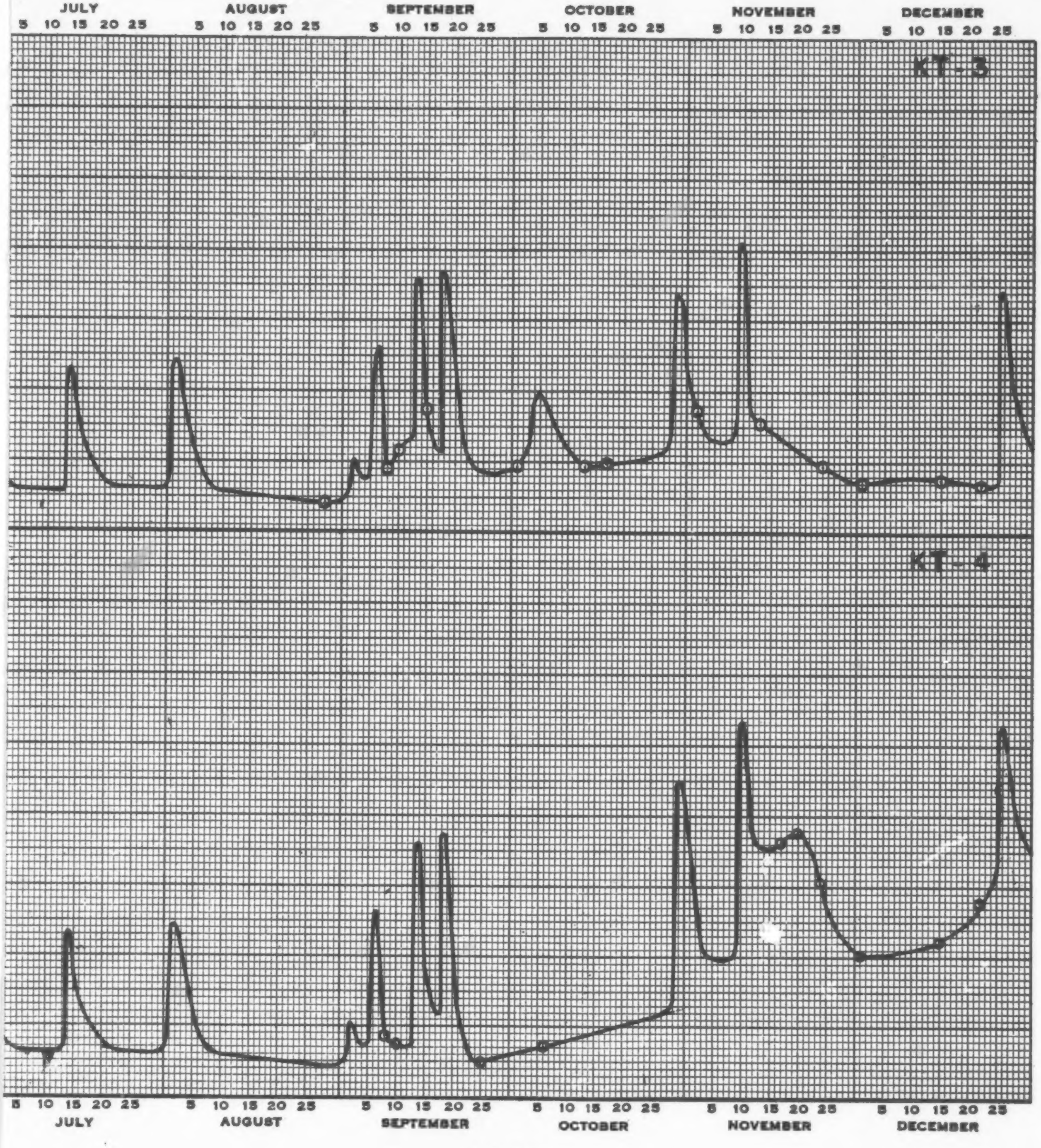

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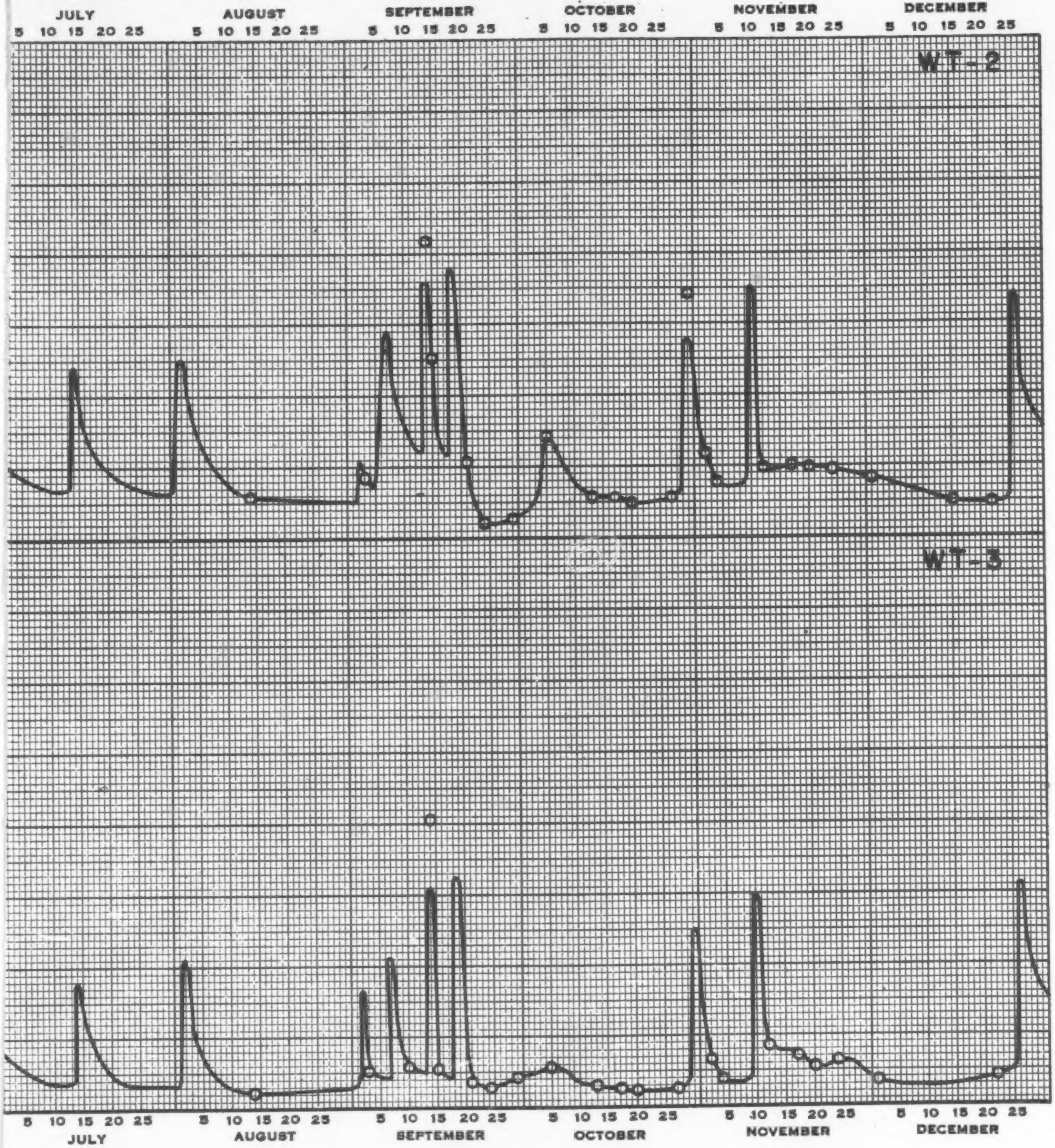

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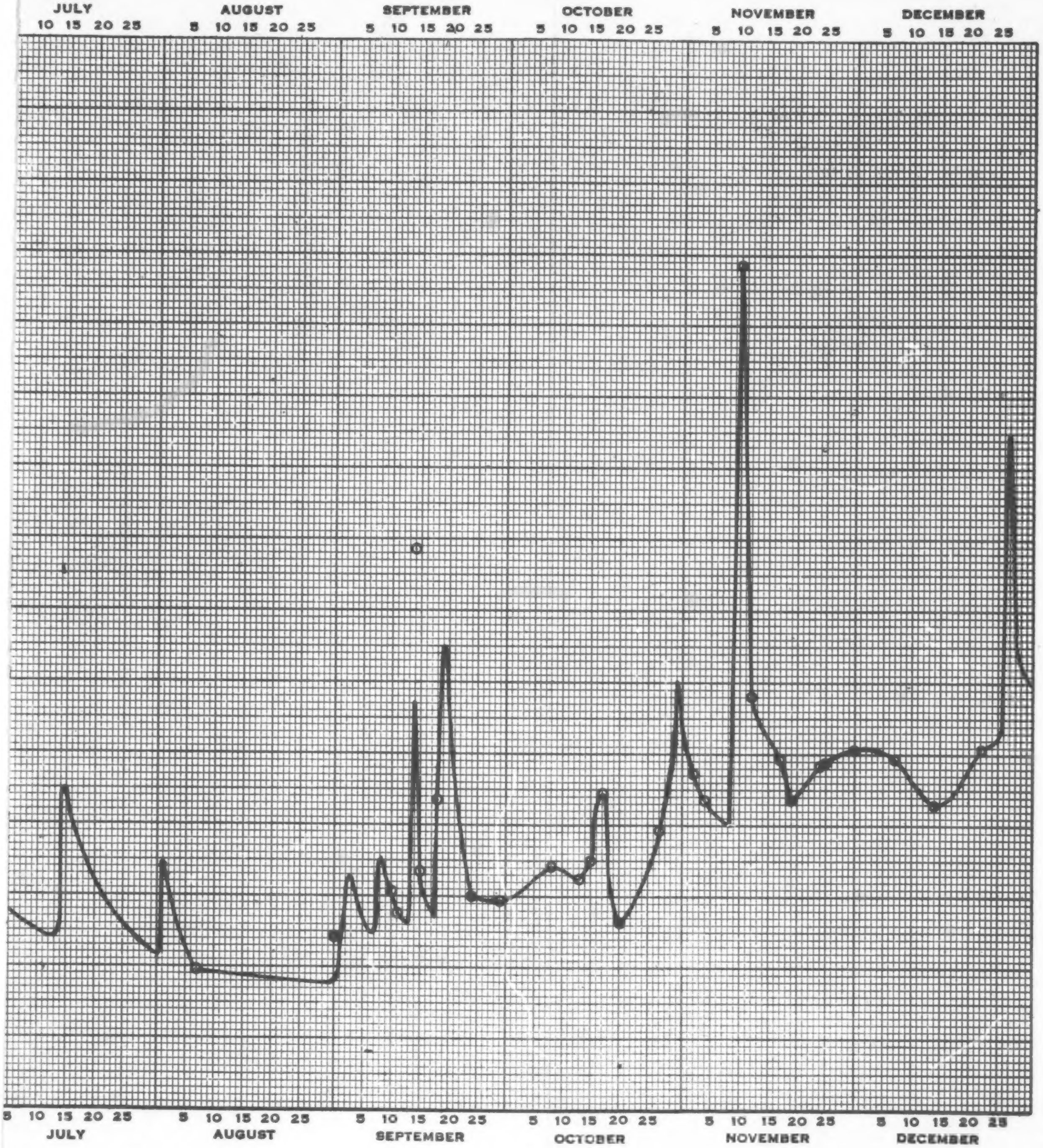

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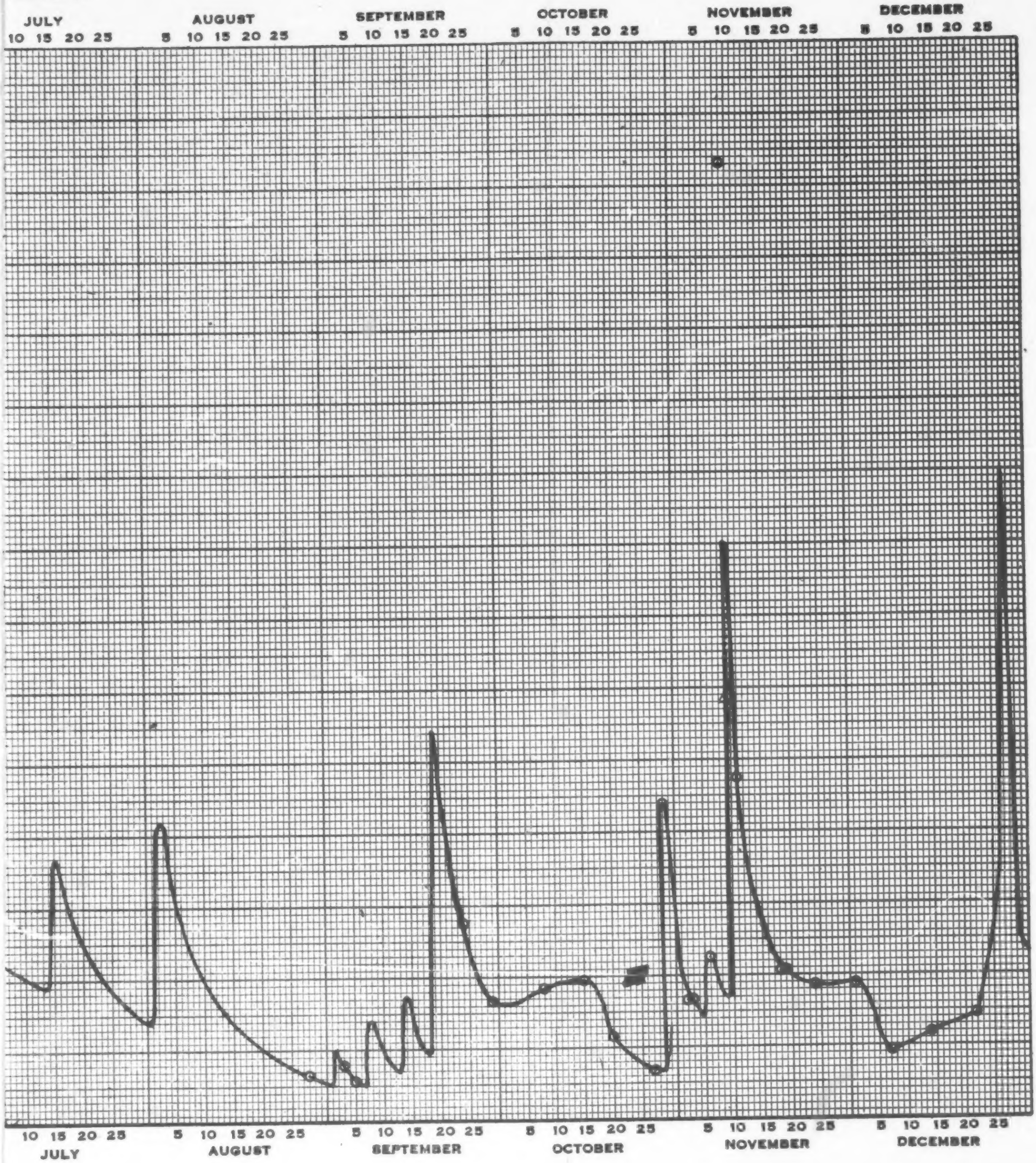

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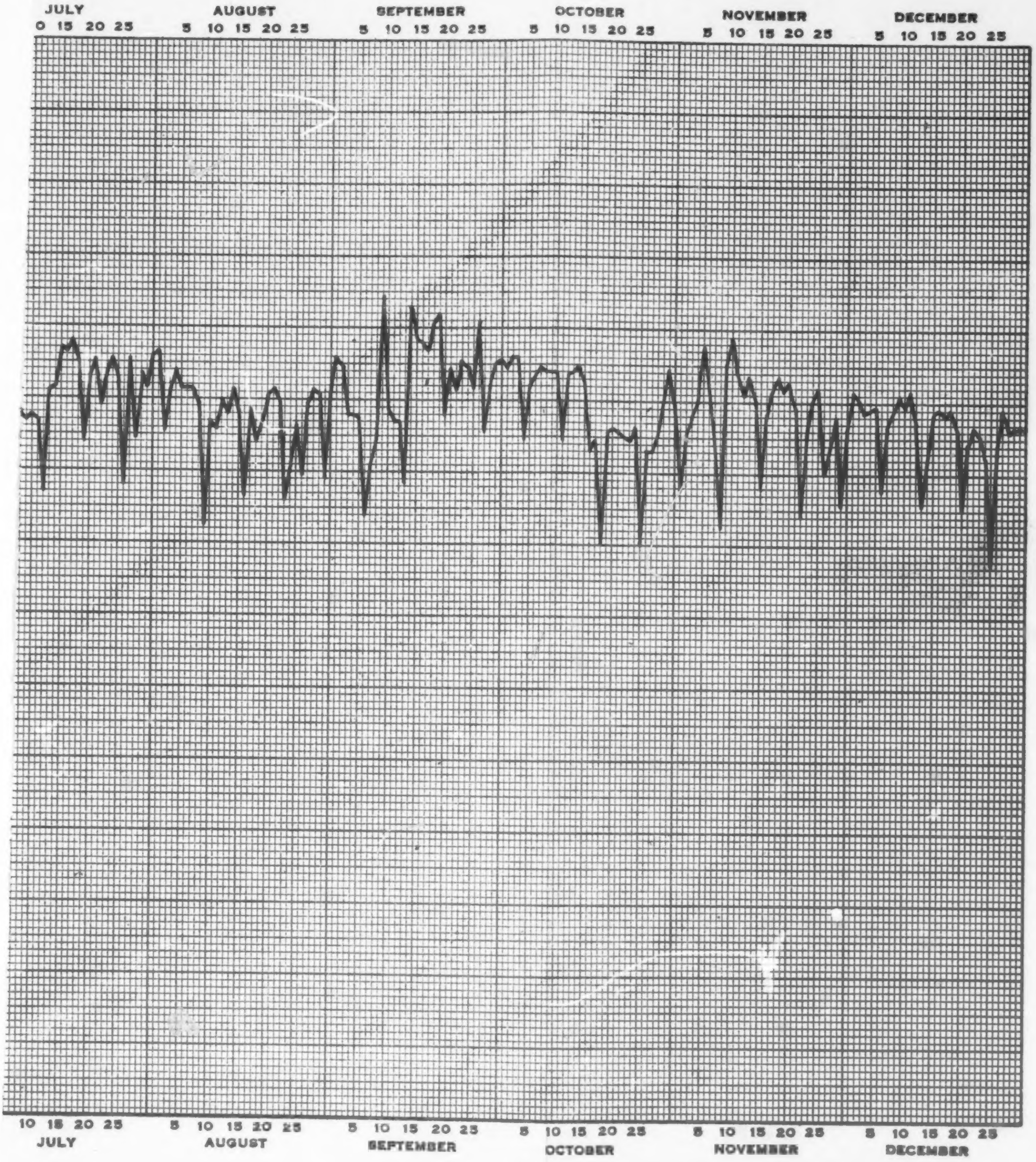
TREATMENT PLANT

SHEET

175<



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